Shoreline Situation Report

CHARLES CITY COUNTY, VIRGINIA

Supported by the National Science Foundation, Research Applied to National Needs Program
NSF Grant Nos. GI 34869 and GI 38973 to the Wetlands/Edges Program, Chesapeake Research Consortium, Inc.
Published With Funds Provided to the Commonwealth by the Office of Coastal Zone Management,
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Chesapeake Research Consortium Report Number 49
Special Report In Applied Marine Science and Ocean Engineering Number 115 of the

VIRGINIA INSTITUTE OF MARINE SCIENCE
Gloucester Point, Virginia 23062

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INTRODUCTION

1.1 PURPOSES AND GOALS

It is the objective of this report to supply an assessment, and at least a partial integration, of those important shoreland parameters and characteristics which will aid the planners and the managers of the shorelands in making the best decisions for the utilization of this limited and very valuable resource. The report gives particular attention to the problem of shore erosion and to recommendations concerning the alleviation of the impact of this problem. In addition, we have tried to include in our assessment a discussion of those factors which might significantly limit development of the shoreline and, in some instances, a discussion of some of the potential or alternate uses of the shoreline, particularly with respect to recreational use, since such information could aid potential users in the perception of a segment of the shoreline.

The basic advocacy of the authors in the preparation of the report is that the use of shorelands should be planned rather than haphazardly developed in response to the short term pressures and interests. Careful planning could reduce the conflicts which may be expected to arise between competing interests. Shoreland utilization in many areas of the country, and indeed in some places in Virginia, has proceeded in a manner such that the very elements which attracted people to the shore have been destroyed by the lack of planning and forethought.

The major man-induced uses of the shorelands are:

- -- Residential, commercial, or industrial development
- -- Recreation
- -- Transportation
- -- Waste disposal
- -- Extraction of living and non-living resources

Aside from the above uses, the shorelands serve various ecological functions.

The role of planners and managers is to optimize the utilization of the shorelands and to minimize the conflicts arising from competing demands. Furthermore, once a particular use has been decided upon for a given segment of shoreland, both the planners and the users want that selected use to operate in the most effective manner. A park planner, for example, wants the allotted space to fulfill the design most efficiently. We hope that the results of our work are useful to the planner in designing the beach by pointing out the technical feasibility of altering or enhancing the present configuration of the shore zone. Alternately, if the use were a residential development, we would hope our work would be useful in specifying the shore erosion problem and by indicating defenses likely to succeed in containing the erosion. In summary our objective is to provide a useful tool for enlightened utilization of a limited resource, the shorelands of the Commonwealth.

Shorelands planning occurs, either formally or informally, at all levels from the private owner of shoreland property to county governments, to planning districts and to the state and federal agency level. We feel our results will be useful at all these levels. Since the most basic level of comprehensive planning and zoning is at the county or city level, we have executed our report on that level although we realize some of the information may be most useful at a higher governmental level. The Commonwealth of Virginia has traditionally chosen to place as much as possible, the regulatory decision processes at the county level. The Virginia Wetlands Act of 1972 (Chapter 2.1, Title 62.1, Code of Virginia), for example provides for the establishment of County Boards to act on applications for alterations of wetlands. Thus, our focus at the county level is intended to interface with and to support the existing or pending county regulatory mechanisms concerning activities in the shorelands zone.

1.2 ACKNOWLEDGEMENTS

This report was prepared with funds provided by the Research Applied to National Needs Program (RANN) of the National Science Foundation through the Chesapeake Research Consortium, Inc. The report was published with funds provided to the Commonwealth by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, Grant Number 04-5-158-50001. Beth Marshall typed the manuscript. Bill Jenkins and Ken Thornberry prepared the photographs. Lynne Rogers assisted with data reduction. We would like to thank the numerous other persons in Virginia and Maryland that have assisted our work with their suggestions and criticisms of our ideas and methods.

CHAPTER 2
Approach Used and Elements Considered

CHAPTER 2
APPROACH USED AND ELEMENTS CONSIDERED

2.1 APPROACH TO THE PROBLEM

In the preparation of this report the authors utilized existing information wherever possible. For example, for such elements as water quality characteristics, zoning regulations, or flood hazard, we reviewed relevant reports by local, state, or federal agencies. Much of the desired information, particularly with respect to erosional characteristics, shoreland types, and use was not available, so we performed the field work and developed classification schemes. In order to analyze successfully the shoreline behavior we placed heavy reliance on low altitude, oblique, color, 35 mm photography. We photographed the entire shoreline of each county and cataloged the slides for easy access at VIMS, where they remain available for use. We then analyzed these photographia materials, along with existing conventional aerial photography and topographic and hydrographic maps, for the desired elements. We conducted field inspection over much of the shoreline, particularly at those locations where office analysis left questions unanswered. In some cases we took additional photographs along with the field visits to document the effectiveness of shoreline defenses.

The basic shoreline unit considered is called a subsegment, which may range from a few hundred feet to several thousand feet in length. The end points of the subsegments were generally chosen on physiographic consideration such as changes in the character of erosion or deposition. In those cases where a radical change in land use occurred, the point of change was taken as a boundary point of the subsegment. Segments are groups of subsegments. The boundaries for segments also were selected on physiographic units such as necks or peninsulas between major tidal creeks. Finally, the county itself is considered as a sum of shoreline segments.

The format of presentation in the report follows a sequence from general summary statements for the county (Chapter 3) to tabular segment summaries and finally detailed descriptions and maps for each subsegment (Chapter 4). The purpose in choosing this format was to allow selective use of the report since some users' needs will adequately be met with the summary overview of the county while others will require the detailed discussion of particular subsegments.

2.2 CHARACTERISTICS OF THE SHORELANDS INCLUDED IN THE STUDY

The characteristics which are included in this report are listed below followed by a discussion of our treatment of each.

a) Shorelands physiographic classification
b) Shorelands use classification
c) Shorelands ownership classification
d) Zoning
e) Water quality
f) Shore erosion and shoreline defenses
g) Limitations to shore use and potential or alternate shore uses
h) Distribution of marshes
i) Flood hazard levels
j) Shellfish leases and public shellfish grounds
k) Beach quality

a) Shorelands Physiographic Classification

The shorelands of the Chesapeake Bay System may be considered as being composed of three interacting physiographic elements: the fastlands, the shore and the nearshore. A graphic classification based on these three elements has been devised so that the types for each of the three elements portrayed side by side on a map may provide the opportunity to examine joint relationships among the elements. As an example, the application of the system permits the user to determine miles of high bluff shoreland interfacing with marsh in the shore zone.

For each subsegment there are two length measurements, the shore-nearshore interface or shoreline, and the fastland-shore interface. The two interface lengths differ most when the shore zone is embayed or extensive marsh. On the subsegment maps, a dotted line represents the fastland-shore interface when it differs from the shoreline. The fastland-shore interface length is the base for the fastland statistics.

Definitions:

Shore Zone

This is the zone of beaches and marshes. It is a buffer zone between the water body and the fastland. The seaward limit of the shore zone is the break in slope between the relatively steeper shoreface and the less steep nearshore zone. The approximate landward limit is a contour line representing one and a half times the mean tide range above mean low water (refer to Figure 1). In operation with topographic maps the inner fringe of the marsh symbols is taken as the landward limit.

The physiographic character of the marshes has also been separated into three types (see Figure 2).

Fringe marsh is that which is less than 400 feet in width and which runs in a band parallel to the shore. Extensive marsh is that which has extensive acreage projecting into an estuary or river. An embayed marsh is a marsh which occupies a reentrant or drowned creek valley. The purpose in delineating these marsh types is that the effectiveness of the various functions of the marsh will, in part, be determined by type of exposure to the estuarine system. A fringe marsh may, for example, have maximum value as a buffer to wave erosion of the fastland. An extensive marsh, on the other hand, is likely a more efficient transporter of detritus and other food chain materials due to its greater drainage density than an embayed marsh. The central point is that planners, in the light of ongoing and future research, will desire to weight various functions of marshes and the physiographic delineation aids their decision making by denoting where the various types exist.

The classification used is:

- Beach
- Marsh
  - Fringe marsh, <400 ft. (122 m) in width along shores
  - Extensive marsh
  - Embayed marsh, occupying a drowned valley or reentrant
  - Artificially stabilized

Fastland Zone

The zone extending from the landward limit of the shore zone is termed the fastland. The fastland is relatively stable and is the site of most material development or construction. The physiographic classification of the fastland is based upon the average slope of the land within 400 feet (122 m) of the fastland - shore boundary. The general classification is:

- Low shore, 20 ft. (6 m) or less of relief; with or without cliff
- Moderately low shore, 20-40 ft. (6-12 m) of relief; with or without cliff
- Moderately high shore, 40-60 ft. (12-18 m) of relief; with or without cliff
- High shore, 60 ft. (18 m) or more of relief; with or without cliff.

Two specially classified exceptions are sand dunes and areas of artificial fill.

Nearshore Zone

The nearshore zone extends from the shore zone to the 12-foot (MLW datum) contour. In the smaller tidal rivers the 6-foot depth is taken as the reference depth. The 12-foot depth is probably the maximum depth of significant sand transport by waves in the Chesapeake Bay area. Also, the distinct drop-off into the river channels begins roughly at the 12-foot depth. The nearshore zone includes any tidal flats.

The class limits for the nearshore zone classifications were chosen following a simple statistical study. The distance to the 12-foot underwater contour (isobath) was measured on the appropriate charts at one-mile intervals along the shorelines of Chesapeake Bay and the James, York, Rappahannock, and Potomac Rivers. Means and standard deviations for each of the separate regions and for the entire combined system were calculated and compared. Although the distributions were non-normal, they were generally comparable, allowing the data for the entire combined system to determine the class limits.

The calculated mean was 919 yards with a standard deviation of 1,003 yards. As our aim was to determine general, serviceable class limits, these calculated numbers were rounded to 900 and 1,000 yards respectively. The class limits were set at half the standard deviation (500 yards) each side of the mean. Using this procedure a narrow nearshore zone is one 0-400 yards in width, intermediate 400-1,400, and wide greater than 1,400.

The following definitions have no legal significance and were constructed for our classification purposes:

- Narrow, 12-ft. (3.7 m) isobath located <400 yards from shore
- Intermediate, 12-ft. (3.7 m) isobath 400-1,400 yards from shore
- Wide, 12-ft. (3.7 m) isobath >1,400 yards
  - Subclasses: with or without bars
    with or without tidal flats
    with or without submerged vegetation

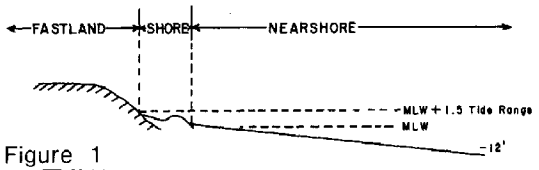


Figure 1

A profile of the three shorelands components.

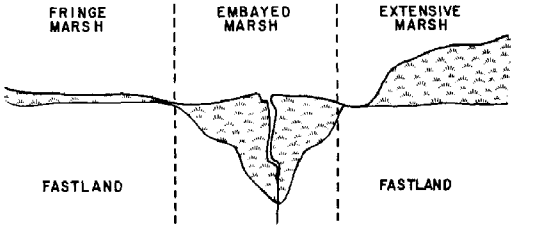


Figure 2

A plan view of the three marsh types.

b) Shorelands Use Classification

Fastland Zone

Residential

Includes all forms of residential use with the exception of farms and other isolated dwellings. In general, a residential area consists of four or more residential buildings adjacent to one another. Schools, churches, and isolated businesses may be included in a residential area.

Commercial

Includes buildings, parking areas, and other land directly related to retail and wholesale trade and business. This category includes small industry and other anomalous areas within the general commercial context. Marinas are considered commercial shore use.

Industrial

Includes all industrial and associated areas. Examples: warehouses, refineries, shipyards, power plants, railyards.

Government

Includes lands whose usage is specifically controlled, restricted, or regulated by governmental organizations: e.g., Camp Peary, Fort Story.

Recreation and Other Public Open Spaces

Includes designated outdoor recreation lands and miscellaneous open spaces. Examples: golf courses, tennis clubs, amusement parks, public beaches, race tracks, cemeteries, parks.

Preserved

Includes lands preserved or regulated for environmental reasons, such as wildlife or wildfowl sanctuaries, fish and shellfish conservation grounds, or other uses that would preclude development.

Agricultural

Includes fields, pastures, croplands, and other agricultural areas.

Unmanaged

Includes all open or wooded lands not included in other classifications:

a) Open: Brush land, dune areas, wastelands; less than 40% tree cover.

b) Wooded: more than 40% tree cover.

The shoreland use classification applies to the general usage of the fastland area to an arbitrary distance of half mile from the shore or beach zone or to some less distant, logical barrier. In multi-usage areas one must make a subjective selection as to the primary or controlling type of usage. For simplicity and convenience, managed woodlands are classified as "unmanaged, wooded" areas.

Shore Zone

Bathing
Boat launching
Bird watching
Waterfowl hunting

Nearshore Zone

Pound net fishing
Shellfishing
Sport fishing
Extraction of non-living resources
Boating
Water sports

c) Shorelands Ownership Classification

The shorelands ownership classification used has two main subdivisions, private and governmental, with the governmental further divided into federal, state, county, and town or city. Application of the classification is restricted to fastlands alone since the Virginia fastlands ownership extends to mean low water. All bottoms below mean low water are in State ownership.

d) Water Quality

The ratings of satisfactory, intermediate or unsatisfactory assigned to the various subsegments are taken from a listing at the Virginia Bureau of Shellfish Sanitation, based on information from water samples collected in the various tidewater shellfishing areas. The Bureau attempts to visit each area at least once a month.

The ratings are defined primarily in regard to number of coliform bacteria. For a rating of satisfactory the maximum limit is an MPN (Most Probable Number) of 70 per 100 ml. The upper limit for fecal coliforms is an MPN of 23. Usually any count above these limits results in an unsatisfactory rating, and, from the Bureau's standpoint, results in restricting the waters from the taking of shellfish for direct sale to the consumer.

There are instances however, when the total coliform MPN may exceed 70, although the fecal MPN does not exceed 23, and other conditions are acceptable. In these cases an intermediate rating may be assigned temporarily, and the area will be permitted to remain open pending an improvement

in conditions.

Although these limits are somewhat more stringent than those used in rating recreational waters (see Virginia State Water Control Board, Water Quality Standards 1946, amended 1970), they are used here because the Bureau of Shellfish Sanitation provides the best areawide coverage available at this time. In general, any waters fitting the satisfactory or intermediate categories would be acceptable for water recreation.

e) Zoning

In cases where zoning regulations have been established the existing information pertaining to the shorelands has been included in the report.

f) Shore Erosion and Shoreline Defenses

The following ratings are used for shore erosion:

slight or none - less than 1 foot per year

moderate - - - - 1 to 3 feet per year

severe - - - - - greater than 3 feet per year

The locations with moderate and severe ratings are further specified as being critical or non-critical. The erosion is considered critical if buildings, roads, or other such structures are endangered.

The degree of erosion was determined by several means. In most locations the long term trend was determined using map comparisons of shoreline positions between the 1850's and the 1940's. In addition, aerial photographs of the late 1930's and recent years were utilized for an assessment of more recent conditions. Finally, in those areas experiencing severe erosion field inspections and interviews were held with local inhabitants.

The existing shoreline defenses were evaluated as to their effectiveness. In some cases repetitive visits were made to monitor the effectiveness of recent installations. In instances where existing structures are inadequate, we have given recommendations for alternate approaches. Furthermore, recommendations are given for defenses in those areas where none currently exist. The primary emphasis is placed on expected effectiveness with secondary consideration to cost.

g) Limitations to Shore Use and Potential or Alternate Shore Uses

In this section we point out specific factors which may impose significant limits on the type or extent of shoreline development. This may result in a restatement of other factors from elsewhere in the report, e.g., flood hazard or erosion, or this may be a discussion of some other factor pertaining to the particular area.

Also we have placed particular attention on the recreational potential of the shore zone. The possible development of artificial beach, erosion protection, etc., influence the evaluation of an area's potential. Similarly, potential alternate shore uses are occasionally noted.

h) Distribution of Marshes

The acreage and physiographic type of the marshes in each subsegment is listed. These estimates of acreages were obtained from topographic maps and should be considered only as approximations. Detailed county inventories of the wetlands are being conducted by the Virginia Institute of Marine Science under the authorization of the Virginia Wetlands Act of 1972 (Code of Virginia 62.1-13.4). These surveys include detailed acreages of the grass species composition within individual marsh systems. In Shoreline Situation Reports of counties that have had marsh inventories, the marsh number is indicated, thus allowing the user of the Shoreline Situation Report to key back to the formal marsh inventory for additional data. The independent material in this report is provided to indicate the physiographic type of marsh land and to serve as a rough guide to marsh distribution, pending a formal inventory. Additional information on wetlands characteristics may be found in Coastal Wetlands of Virginia: Interim Report No. 3, by G.M. Silberhorn, G.M. Dawes, and T.A. Barnard, Jr., SRAMSOE No. 46, 1974, and in other VIMS publications.

i) Flood Hazard Levels

The assessment of tidal flooding hazard for the whole of the Virginia tidal shoreland is still incomplete. However, the United States Army Corps of Engineers has prepared reports for a number of localities which were used in this report. Two tidal flood levels are customarily used to portray the hazard. The Intermediate Regional Flood is that flood with an average recurrence time of about 100 years. An analysis of past tidal floods indicates it to have an elevation of approximately 8 feet above mean water level in the Chesapeake Bay area. The Standard Project Flood level is established for land planning purposes which is placed at the highest probable flood level.

j) Shellfish Leases and Public Grounds

The data in this report show the leased and public shellfish grounds as portrayed in the Virginia State Water Control Board publication "Shellfish growing areas in the Commonwealth of Virginia: Public, leased and condemned," November 1971, and as periodically updated in other similar reports. Since the condemnation areas change with time they are not to be taken as definitive. However, some insight to the conditions at the date of the report are available by a comparison between the shellfish grounds maps and the water quality maps for which water quality standards for shellfish were used.

k) Beach Quality

Beach quality is a subjective judgment based upon considerations such as the nature of the beach material, the length and width of the beach area, and the general aesthetic appeal of the beach setting.

CHAPTER 3
Present Shorelands Situation

CHAPTER 3
PRESENT SHORELINE SITUATION OF CHARLES CITY COUNTY, VIRGINIA

3.1 THE SHORELANDS OF CHARLES CITY COUNTY

Charles City County, located halfway between Richmond and Newport News, is bounded by the Chickahominy and James Rivers. The shorelands reflect the predominantly rural character of the county. Almost ninety percent of the shorelands are either used for agriculture or are woodlands. Eight percent is part of a state owned preserved area.

The county has little industry; over seventy-five percent of the employed persons commute to neighboring urban areas for jobs. State Route 5, which runs from Richmond to Williamsburg, parallels the James River a few miles inland. Much residential development has taken place near to this principal highway. Only two percent of the shorelands are used for residential purposes. Few areas of the shoreline are actively used for recreational purposes.

There are 137.0 measured miles of fastland in Charles City County, ninety-four percent of which is either low or moderately low shore (see Table 1). Only two percent of the fastlands are bluff areas. The county has 121.2 miles of shoreline, of which eighty-four percent is marsh, fifteen percent is beach, and one percent is artificially stabilized. The marsh figure can be further broken down to twenty-seven percent fringe marsh and fifty-seven percent embayed and extensive marsh. Marsh areas, especially embayed and extensive marshes, should be preserved, as they are important erosion and flood control agents and provide habitats for many species of aquatic life. Beaches in the county are generally very thin and often vegetated. Few seem suitable for recreational usage.

No water quality data for Charles City County is available from the Bureau of Shellfish Sanitation, since the salinity of the James River here is too low to be conducive to shellfish propagation. Data taken from the Water Quality Inventory (305 (b) Report) of the Virginia State Water Control Board (April, 1976) indicates that while the water quality of the James is generally good, seasonal and sectional problems do exist. These problems are usually caused by upstream discharges into the river.

Richmond, Hopewell, and Petersburg all have numerous domestic and industrial discharges into the James River which can adversely affect the water quality. Flood waters have caused sewer overflows in Richmond, allowing oxidizable organics and bacteria to enter the James. In late 1975, the James River below Richmond was closed to all shellfish and finfish harvesting due to chemical contamination. At the present time, the river is open to the taking of seed oysters.

3.2 SHORELINE EROSION IN CHARLES CITY COUNTY

The processes of erosion and accretion are continually affecting the shorelands of Virginia. The rate and severity of erosion in any one area is dependent upon many variables such as the location of the section, the physiography and geology of its shorelands, the depth and width of the water body, and man's use of the shorelands. The many combinations of these and other factors determine the rate any given area on the shoreline will erode or accrete.

Charles City County is located on the James River approximately midway between Newport News and Richmond. The Chickahominy River forms the eastern boundary of the county. Both rivers are relatively low energy water bodies in this section. However, erosion of the shoreline is evidenced along both bodies of water.

A primary cause of erosion of the fastland is waves generated by local winds. The height and growth of waves is controlled by four factors: the overwater distance across which the wind blows (the fetch), the velocity of the wind, the duration of time that the wind blows, and the depth of the water. The James River at Charles City County is neither wide enough nor straight enough to have a really significant fetch. Without a long fetch, erosive wave action is minimized for most of the county. However, elevated water levels associated with storms in the Bay do affect the county's shorelands. Storm surges may be as much as two or more feet above normal high tide levels. Under such circumstances, the easily eroded fastland behind beaches or marsh areas can be exposed to direct wave action.

The county is also subject to the effects of heavy upstream rains. Higher water levels associated with such storms also allow wave actions to concentrate on the vulnerable fastland behind the buffer zone.

Erosion in Charles City County is also the result of downhill rain runoff. This can be of particular consequence in high bluff areas. The washing of the cliff face can effectively undermine trees along the shoreline. These trees eventually fall, carrying with them large amounts of soil suspended in their root systems. Though few areas in the county have significant bluffs

along the shoreline, any wooded gradient can be so affected.

Most of the erosion found along the Chickahominy River occurs at the bends in the river. The river current is greatest on the outside of the meanders and is much less on the inside. The amount and rate of erosion depends upon the composition of the land, the speed of the current, and the maturity of the meander. Figure 3 shows erosion and accretion along a typical meander in the Chickahominy River.

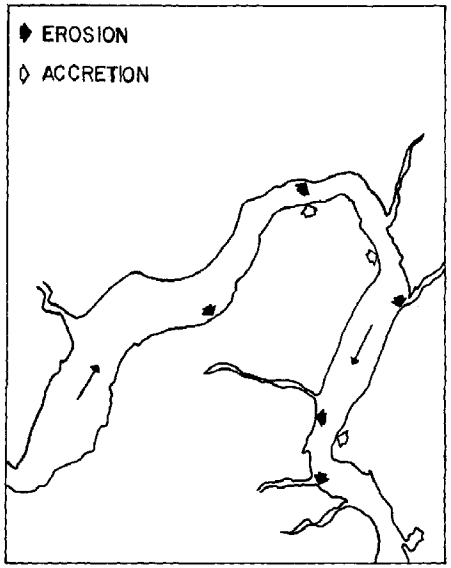


FIGURE 3. TYPICAL RIVER MEANDER

There are other factors which contribute to the erosion rate of a given area. Man's activities along the shoreline and the frequency of boat traffic in the river both have an effect on the erosion rate. Erosion in Charles City County is not a critical problem. Many areas have moderate erosion problems, but none are severe and most are located along unmanaged wooded shorelands. Attempts at halting erosion in a given area should be carefully conceived. Professional advice and planning are necessary for a successful shoreline defense system. Whenever possible, where erosion affects several landowners, a joint plan of defense is preferred. Not only are costs reduced, but the chances for aggravated erosion nearby is greatly diminished.

3.3 SHORE USE LIMITATIONS

The overwhelming majority of the shorelands in Charles City County are either unused or are used for agriculture. Less than four percent is presently developed. The rural character of the county is the result of a combination of factors which continue to limit growth in the county and along its shorelands.

Fifty-seven percent of the shoreline is either embayed or extensive marsh (a tidal marsh inventory for Charles City County is forthcoming). These areas serve as important flood and erosion control agents and are habitats for numerous aquatic life. The Virginia Wetlands Act of 1972 restricts development in marshes and strictly controls any proposed alteration of them. Development behind marsh areas would have limited and difficult access to the water.

Access to the shoreline of Charles City is also limited. State Route 5 parallels the shoreline approximately two miles inland. Though several roads join areas of the shorelands with Route 5, most sections have only private lanes to residences near the water. The costly process of providing paved roads to these areas seems unjustified for the present. Most development has located along the major inland routes, and future trends will probably follow existing patterns. This seems to be substantiated by the fact that over seventy-five percent of the employed persons in the county commute to other areas for work. These commuters need quick and easy access to major thoroughfares. A major drawback to any large scale development is the county's lack of public water and sewage. Any area has only a limited residential potential without such facilities.

Development along some areas of the shorelands is restricted by the present use. Eight percent of the fastland is owned by the State Commission of Game and Inland Fisheries. This section of the Chickahominy River is preserved, with areas to be used as low intensity recreational parks. Three Colonial plantations located along the James River are popular tourist attractions. The surrounding lands should be kept in harmony with these historic landmarks.

Erosion is not a critical problem in Charles City mainly because most eroding areas are undeveloped lands. Development in these areas and ensuing attempts at shore stabilization can create critical problems for the specific location and for sites downstream. As stated before, any alterations of the shoreline should be done only with professional advice and guidance.

New development along the shoreline in Charles City County is limited to isolated areas of the fastland. Several sites are zoned for industrial use. The fastland at the head of Queens Creek has the potential of becoming the major residential and business center in the county. County

administrative offices, the courthouse, a school, and various residences are already located in the vicinity. Any shoreline structures should ensure against adding any nutrients or contaminants to the rivers.

The county's recreational needs should be partially met by the new state owned park on the Chickahominy River (Subsegments 4B and 4C). The park is scheduled to include a public boat ramp and facilities for camping and picnicking. The county's Comprehensive Plan has proposed the creation of four inland neighborhood parks and two regional parks. A community center is located northeast of the courthouse. Additional shoreline recreational facilities, though possible, are not expected to be developed in the near future.

In summary, the rural nature of Charles City County should be preserved. Few changes in shorelands use are expected. Though two industrial sites may be developed, most of the shoreline should remain as agricultural or wooded areas.

Figure 4

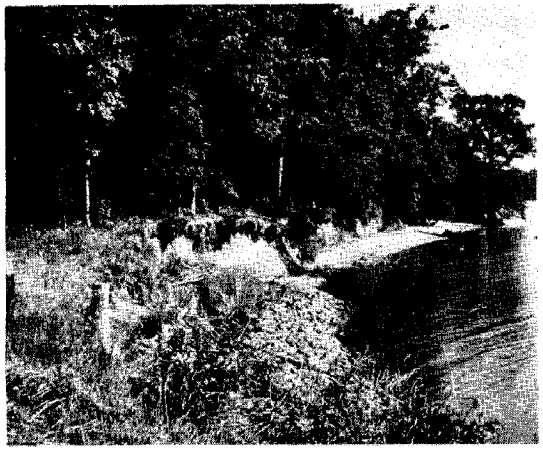


Figure 5

FIGURE 4: Dancing Point, aerial photo. This area has been stabilized with rubble riprap.

FIGURE 5: Ground view of Dancing Point. Note erosion of the bluff area not protected by riprap.

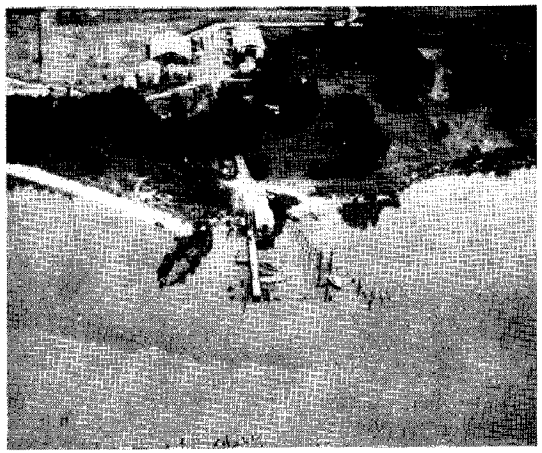


Figure 6

Figure 7

FIGURE 6: Ruins of dock at Tettington. The area to the left has good beaches. The shoreline to the right has various types of rubble acting in places like riprap.

FIGURE 7: Tettington ground view. The beach area here is littered with much debris.

FIGURE 8: Aerial view of Westover. Note the well emplaced bulkhead protecting the entire length of shoreline.

FIGURE 9: Westover ground view. The bulkhead is fronted by a pebble beach and some grasses.

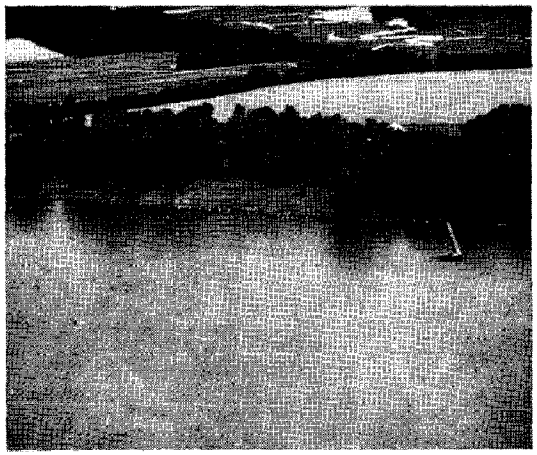


Figure 8

Figure 9

Figure 10

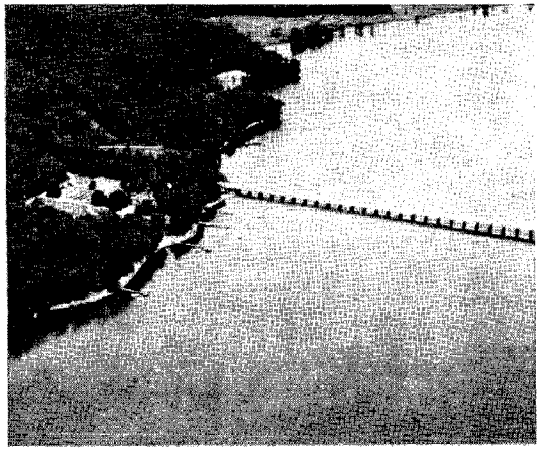
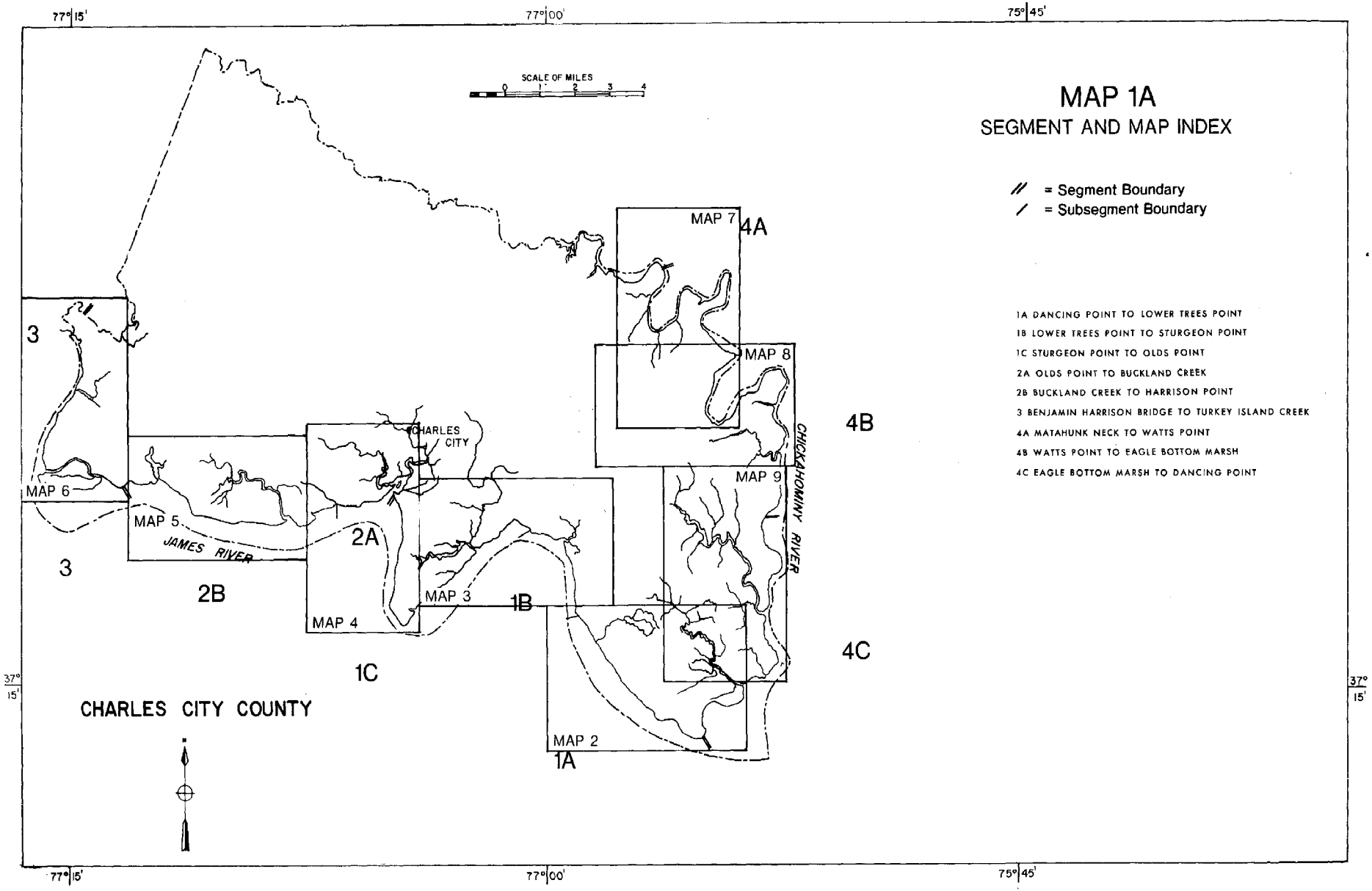


Figure 11

FIGURE 10: Marina near Mount Airy, Chickahominy River. The bulkhead here is for retaining fill more than for erosion protection.

FIGURE 11: Aerial view of Route 5 bridge over the Chickahominy River. Numerous residences with their private piers are located on the shoreline in this area.

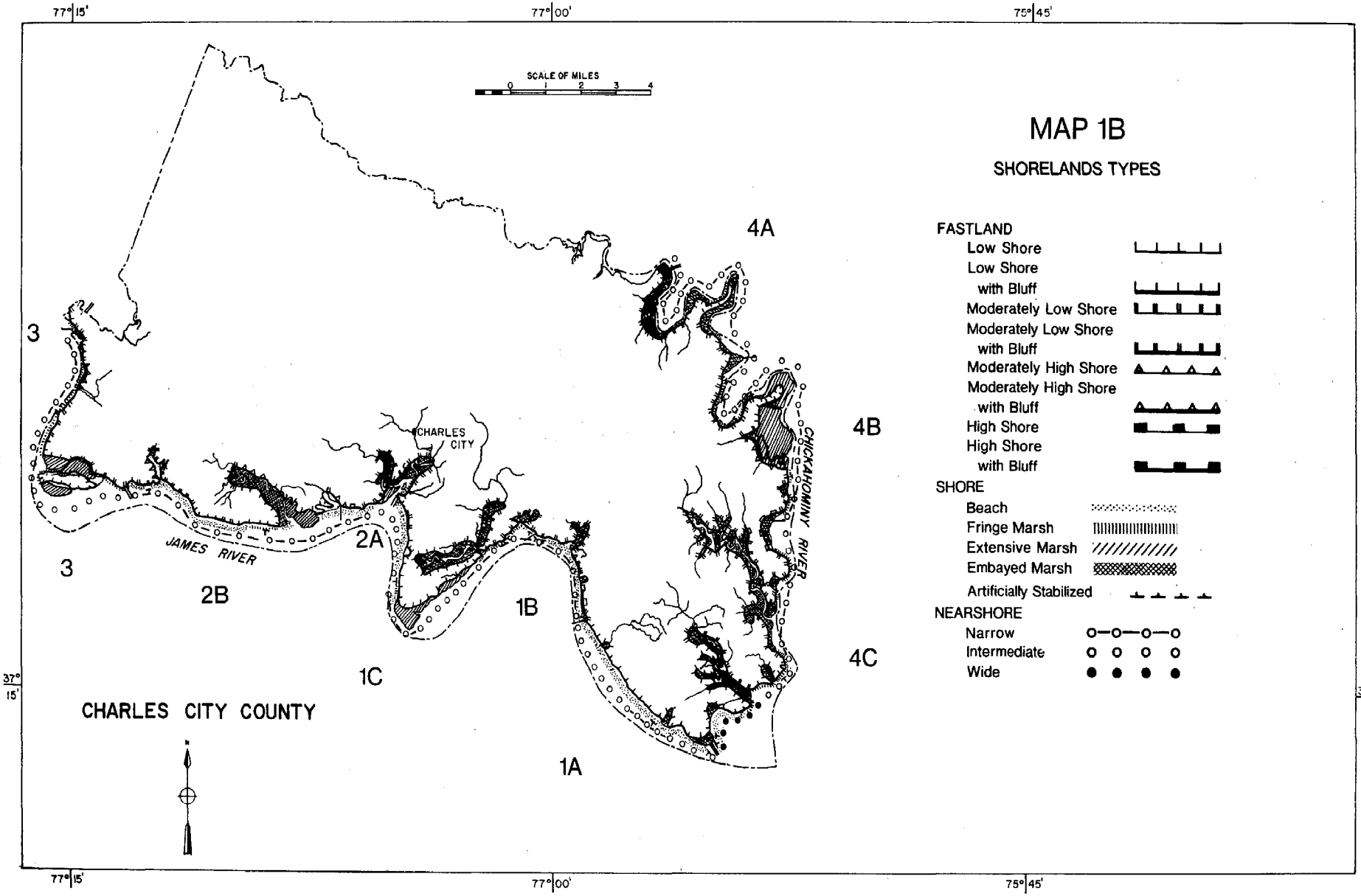


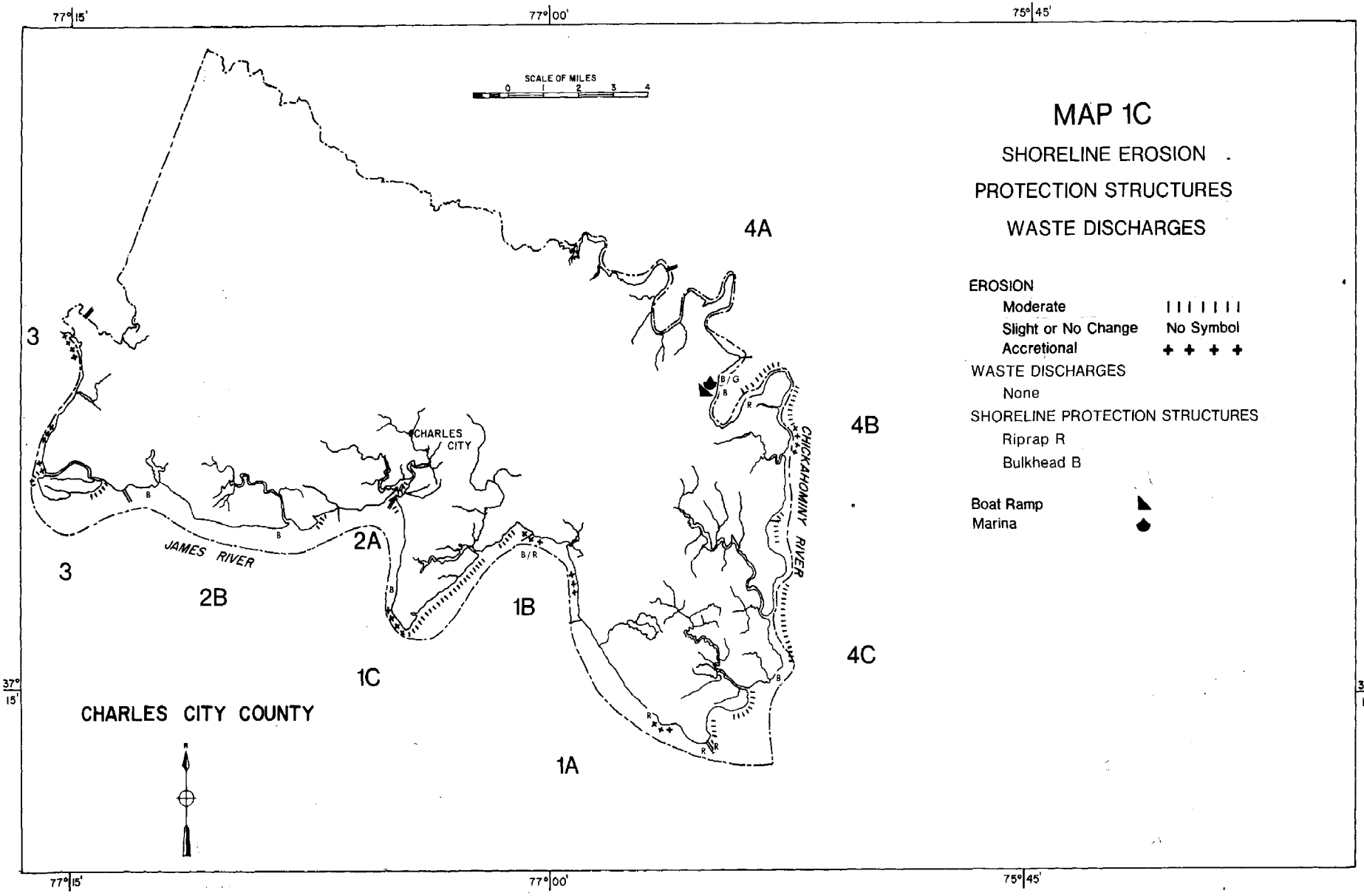
MAP 1A

SEGMENT AND MAP INDEX

// = Segment Boundary
/ = Subsegment Boundary

1A DANCING POINT TO LOWER TREES POINT
1B LOWER TREES POINT TO STURGEON POINT
1C STURGEON POINT TO OLDS POINT
2A OLDS POINT TO BUCKLAND CREEK
2B BUCKLAND CREEK TO HARRISON POINT
3 BENJAMIN HARRISON BRIDGE TO TURKEY ISLAND CREEK
4A MATAHUNK NECK TO WATTS POINT
4B WATTS POINT TO EAGLE BOTTOM MARSH
4C EAGLE BOTTOM MARSH TO DANCING POINT


77°15'
77°00'
75°45'
SCALE OF MILES
0 1 2 3 4
MAP 1B
SHORELANDS TYPES
FASTLAND
Low Shore
Low Shore with Bluff
Moderately Low Shore
Moderately Low Shore with Bluff
Moderately High Shore
Moderately High Shore with Bluff
High Shore
High Shore with Bluff
SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
Artificially Stabilized
NEARSHORE
Narrow
Intermediate
Wide
CHARLES CITY
JAMES RIVER
CHICKAHOMINY RIVER
CHARLES CITY COUNTY
4A
4B
4C
3
3
2A
2B
1B
1C
1A
37°15'



MAP 1C

SHORELINE EROSION
PROTECTION STRUCTURES
WASTE DISCHARGES

EROSION
- Moderate | | | | | | |
- Slight or No Change — No Symbol
- Accretional + + + +

WASTE DISCHARGES
- None

SHORELINE PROTECTION STRUCTURES
- Riprap R
- Bulkhead B

- Boat Ramp
- Marina

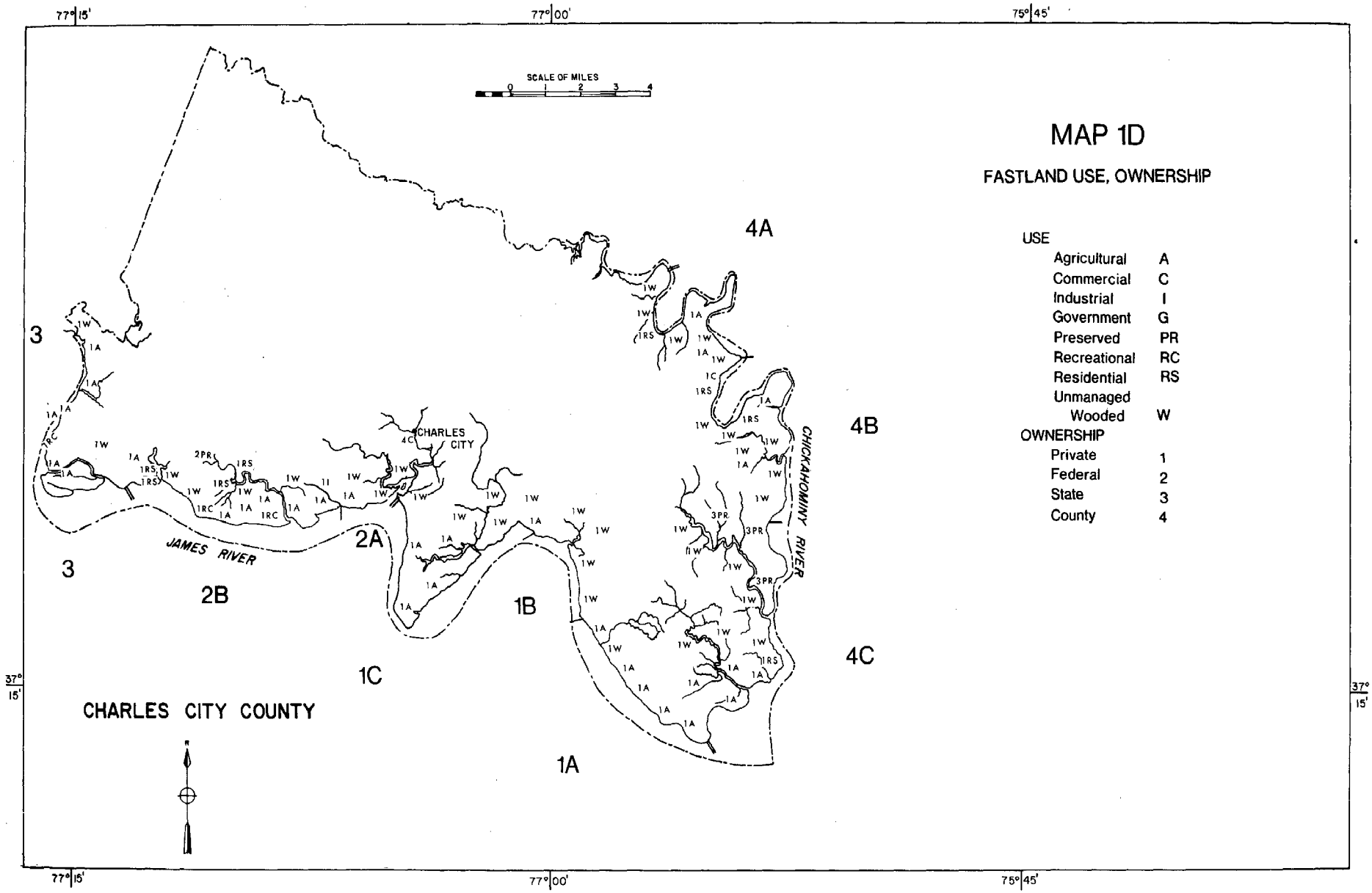

77°15'
77°00'
75°45'
SCALE OF MILES
0 1 2 3 4
MAP 1D
FASTLAND USE, OWNERSHIP
USE
Agricultural A
Commercial C
Industrial I
Government G
Preserved PR
Recreational RC
Residential RS
Unmanaged
Wooded W
OWNERSHIP
Private 1
Federal 2
State 3
County 4
CHARLES CITY COUNTY
CHARLES CITY
JAMES RIVER
CHICKAHOMINY RIVER
4A
4B
4C
3
3
2A
2B
1B
1C
1A
37°15'

TABLE 1. SUMMARY OF CHARLES CITY COUNTY SHORELANDS PHYSIOGRAPHY, FASTLAND USE AND OWNERSHIP (STATUTE MILES)

Physiographic use and ownership classification / Subsegment	SHORELANDS PHYSIOGRAPHY																FASTLAND USE							OWNERSHIP		TOTAL MILES	
	FASTLAND							SHORE					NEARSHORE															
	LOW SHORE	MODERATELY LOW SHORE	MODERATELY LOW SHORE WITH BLUFF	MODERATELY HIGH SHORE	MODERATELY HIGH SHORE WITH BLUFF	HIGH SHORE	HIGH SHORE WITH BLUFF	ARTIFICIALLY STABILIZED	BEACH	EMBAYED MARSH	EXTENSIVE MARSH	FRINGE MARSH	NARROW	INTERMEDIATE	WIDE	AGRICULTURAL	COMMERCIAL	INDUSTRIAL	PRESERVED	RECREATIONAL	RESIDENTIAL	UNMANAGED, WOODED	PRIVATE	STATE	FASTLAND	SHORELINE
1A	7.7							0.2	4.0	0.8		0.1	1.6	3.6		6.4						1.4	7.7		7.7	5.2
1B	0.3	6.4	0.2	0.4	0.4	0.1	0.4	0.1	2.8	4.4		0.1	3.3									8.1	8.1		8.1	7.3
1C	11.1	8.4			0.5			0.3	1.8	6.7	3.8	2.4	6.6	2.2		9.5					0.2	10.3	20.0		20.0	15.0
2A	0.3	7.3		0.3		0.2			1.4	5.8	1.4	1.9	0.9	1.1		0.3		0.2		0.2		7.3	8.1		8.1	10.4
2B	11.8	4.1		1.6				0.2	4.4	8.9	1.9	5.0	7.5			10.6		0.2		0.5	1.1	5.1	17.5		17.5	20.5
3	7.8	3.4		0.2	0.9				0.9	1.0	3.7	9.7	2.9	4.5		8.3				0.2		3.7	12.3		12.3	15.3
4A	5.7	3.1				0.5				6.1	0.8	1.9		0.8		2.7					0.2	6.4	9.3		9.3	8.8
4B	4.0	9.1		0.7		0.6		0.1		0.3	5.0	3.7	8.0	1.1		1.2	0.1		1.1		1.2	10.9	13.3	1.1	14.4	9.1
4C	12.4	25.8				1.4		0.6	2.9	18.3		7.8	2.8	1.9	3.1	5.3			10.1		0.3	23.9	29.5	10.1	39.6	29.6
TOTAL	61.1	67.7	0.2	3.1	1.8	2.7	0.4	1.5	18.3	52.3	16.6	32.6	33.6	15.2	3.1	44.3	0.1	0.4	11.2	0.9	3.0	77.1	125.8	11.2	137.0	121.2
% of SHORELINE								1%	15%	43%	14%	27%	34%	13%	3%											100%
% of FASTLAND	45%	49%	0	2%	1%	2%	0									32%	0	0	8%	1%	2%	56%	92%	8%	100%	

CHAPTER 4

4.1 Table of Subsegment Summaries

4.2 Segment and Subsegment Descriptions

4.3 Segment and Subsegment Maps

TABLE 2. SHORELINE SITUATION REPORT SUBSEGMENT SUMMARY FOR CHARLES CITY COUNTY, VIRGINIA

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	ZONING	FLOOD HAZARD	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
1A DANCING POINT TO LOWER TREES POINT 5.2 miles (7.7 miles of fastland)	FASTLAND: Entirely low shore. SHORE: Artificially stabilized 5%, beach 78%, embayed marsh 15%, and fringe marsh 2%. NEARSHORE: Narrow 31% and intermediate 69%.	FASTLAND: Agricultural 82% and unmanaged, wooded 18%. SHORE: Low intensity recreational use. NEARSHORE: Sport boating, fishing, and commercial shipping to Richmond and Hopewell.	Private.	Agricultural and rural residential.	Moderate, noncritical. The greatest flood hazard here occurs during heavy upstream rains.	Beaches in this subsegment range in quality from poor to good. The better beaches are found around Sandy Point and west of Tettington.	Slight or no change to moderate, noncritical. The area southeast of Lower Trees Point has an historical erosion rate of 1.1 feet per year. There is effective riprap at Dancing Point and Tettington.	Several sections of this subsegment show potential for becoming low intensity recreational areas.
1B LOWER TREES POINT TO STURGEON POINT 7.3 miles (8.1 miles of fastland)	FASTLAND: Low shore 4%, moderately low shore 79%, moderately low shore with bluff 2%, moderately high shore 5%, moderately high shore with bluff 5%, high shore 1%, and high shore with bluff 5%. SHORE: Artificially stabilized 2%, beach 36%, embayed marsh 60%, and fringe marsh 1%. NEARSHORE: Narrow 44%. The waters of Kennon Creek are too narrow and shallow for classification.	FASTLAND: Entirely unmanaged, wooded. SHORE: Some fishing in the marsh creeks. NEARSHORE: Commercial shipping to Hopewell and Richmond.	Private.	Mostly agricultural and rural residential; some light industrial.	Moderate, noncritical. This area's greatest flood hazard occurs during heavy upstream rains.	Poor. There are thin, strip beaches throughout the subsegment.	Slight or no change to moderate, noncritical. There is moderate, noncritical erosion at Oldfield and Bachelor Point, where the historic rate averages from 1.1 to 1.4 feet per year. There is approximately 200 feet of bulkheading at Sturgeon Point.	The area between Kennon Creek and Sturgeon Point has a future potential use as a light industrial site. Other areas have a limited development potential due to the lack of access to the shore.
1C STURGEON POINT TO OLDS POINT 15.0 miles (20.0 miles of fastland)	FASTLAND: Low shore 55%, moderately low shore 42%, and moderately high shore with bluff 3%. SHORE: Artificially stabilized 2%, beach 12%, embayed marsh 45%, extensive marsh 25%, and fringe marsh 16%. NEARSHORE: Narrow 44% and intermediate 15%. The remainder of the shoreline is located along the creeks.	FASTLAND: Agricultural 47%, residential 1%, and unmanaged, wooded 52%. SHORE: Some private use but mostly unused. NEARSHORE: Commercial shipping to Richmond and Hopewell, some sport boating and fishing.	Private.	Agricultural and rural residential.	The major flood hazard is from upstream rains.	Poor. This subsegment has narrow, strip beaches.	Slight or no change to moderate, noncritical. Historically, the areas of most change have been from Kittewan Creek around Weyanoke Point (-1.7 to -1.9 feet per year), and Tyler Creek to Milton Light (-1.4 feet per year). A small area northwest of Weyanoke Point has been accreting at 1.9 feet per year. There is one section of effective bulkheading located southeast of Olds Point.	Low. This area is zoned and used for agricultural purposes. No new development has been proposed for this section.
2A OLDS POINT TO BUCKLAND CREEK 10.4 miles (8.1 miles of fastland)	FASTLAND: Low shore 3%, moderately low shore 91%, moderately high shore 4%, and high shore 2%. SHORE: Beach 13%, embayed marsh 55%, extensive marsh 13%, and fringe marsh 18%. NEARSHORE: Narrow 8% and intermediate 11%. The remainder of the shoreline is located along several creeks.	FASTLAND: Agricultural 4%, industrial 2%, recreational 2%, and unmanaged, wooded 91%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Commercial shipping to Richmond and Hopewell. Sport boating, fishing, and other water related activities.	Private.	Agricultural and rural residential; some light industrial.	As with the previous subsegment, flooding of the lowlands is determined by inland rains.	Poor. This subsegment has narrow, strip beaches.	Slight or no change except for the area between Olds Point to Queens Creek, where the historical erosion rate is 1.5 feet per year.	The lands at the head of Queens Creek have the potential to become a major business center in the county. County government offices, residences, a school, and several country stores are already located here. The Wilcox Wharf area is zoned for light industry and will probably be used as such.
2B BUCKLAND CREEK TO HARRISON POINT 20.5 miles (17.5 miles of fastland)	FASTLAND: Low shore 67%, moderately low shore 24%, and moderately high shore 9%. SHORE: Artificially stabilized 1%, beach 22%, embayed marsh 44%, extensive marsh 9%, and fringe marsh 24%. NEARSHORE: Narrow 36%. The remainder of the subsegment is located along the creeks, which are too narrow and shallow for classification.	FASTLAND: Agricultural 61%, industrial 1%, recreational 3%, residential 6%, and unmanaged, wooded 29%. SHORE: Some waterfowl hunting in the creek marshes. NEARSHORE: Commercial shipping to Richmond and Hopewell. Sport boating and fishing.	Private.	Agricultural.	Moderate, noncritical. Flooding along the river is confined to times when heavy rains occur upstream, causing lowland flooding.	Poor to fair. The majority of the beaches in this subsegment are narrow, strip beaches. The area between Westover and Berkeley has pebble beaches with vegetation.	Slight or no change, except at Bucklers Point where the historical erosion rate is moderate (-1.1 feet per year). There is approximately 1,000 feet of bulkheading at Westover. The ferry dock further upstream has cement bag bulkheading, which is still effective.	Any development along the shoreline should remain harmonious with the area's natural resources. Construction should be confined to low density housing.
3 BENJAMIN HARRISON BRIDGE TO TURKEY ISLAND CREEK 15.3 miles (12.3 miles of fastland)	FASTLAND: Low shore 64%, moderately low shore 28%, moderately high shore 1%, and moderately high shore with bluff 7%. SHORE: Beach 6%, embayed marsh 7%, extensive marsh 24%, and fringe marsh 63%. NEARSHORE: Narrow 19% and intermediate 29%. The remainder of the shoreline is located along several creeks.	FASTLAND: Agricultural 66%, recreational 2%, and unmanaged, wooded 30%. SHORE: Mostly unused. Some waterfowl hunting in Epps Island Marsh. NEARSHORE: Commercial shipping, sport boating, fishing, and other water related activities.	Private.	Agricultural.	Moderate, noncritical, except critical for one residence on Epps Marsh. Flooding occurs here during heavy upstream rains.	Poor. There are narrow, strip beaches throughout the subsegment.	The area appears stable. The shoreline just south of Turkey Island Creek has been accreting at a rate of 3.7 feet per year. There are no endangered or shore protective structures.	To conserve the rural nature of this area, development should be limited to low density housing and public, open recreational areas.

TABLE 2 (cont'd.)

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	ZONING	FLOOD HAZARD	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
4A MATAPEAKE NECK TO WATTS POINT 8.8 miles (9.3 miles of fastland)	FASTLAND: Low shore 61%, moderately low shore 33%, and high shore 5%. SHORE: Embayed marsh 70%, extensive marsh 9%, and fringe marsh 21%. NEARSHORE: Intermediate 9%. The remainder of the river is too narrow and shallow for classification.	FASTLAND: Agricultural 29%, residential 2%, and unmanaged, wooded 69%. SHORE: Mostly unused except for some waterfowl hunting in the marshes. NEARSHORE: Sport fishing and boating.	Private.	Agricultural.	Low, noncritical. There is no significant fetch in this area, and all of the residences are above the 5-foot contour.	There are no beaches in this subsegment.	The area appears stable. There are no endangered or shore protective structures.	Low. The majority of the shoreline will probably remain unmanaged, wooded. A possible use of one section would be a camping area in the vicinity of Graves Landing, where fishing is a popular pass time.
4B WATTS POINT TO EAGLE BOTTOM MARSH 9.1 miles (14.4 miles of fastland)	FASTLAND: Low shore 28%, moderately low shore 63%, moderately high shore 5%, and high shore 4%. SHORE: Artificially stabilized 1%, embayed marsh 3%, extensive marsh 55%, and fringe marsh 41%. NEARSHORE: Narrow 88% and intermediate 12%.	FASTLAND: Agricultural 8%, commercial 1%, preserved 7%, residential 6%, and unmanaged, wooded 76%. SHORE: Waterfowl hunting in the marshes. The remainder of the shoreline is unused, except around Mount Airy, which is used for access to the water. NEARSHORE: Sport boating and fishing.	Private and some state.	Agricultural.	Moderate, critical for several residences along the shoreline that are below the 5-foot contour. The remainder of the subsegment is moderate, noncritical.	There are no beaches in this subsegment.	The area of greatest erosion is around Old Neck Creek, where the historical erosion rate is 4.5 feet per year. The remainder of the subsegment has a moderate, noncritical erosion. Three areas are artificially stabilized, there being approximately 200 feet of bulkhead and 100 feet of riprap. All structures seem effective.	The only section which has potential for future development is around Mount Airy. Care should be taken to prohibit sewage discharge into the river. Elsewhere in the subsegment there is low potential for future development.
4C EAGLE BOTTOM MARSH TO DANCING POINT 29.6 miles (39.6 miles of fastland)	FASTLAND: Low shore 31%, moderately low shore 65%, and high shore 3%. SHORE: Artificially stabilized 2%, beach 10%, embayed marsh 62%, and fringe marsh 26%. NEARSHORE: Narrow 9%, intermediate 7%, and wide 11%. The remainder of the shoreline is located along Morris and Tomahund Creeks.	FASTLAND: Agricultural 13%, preserved 25%, residential 1%, and unmanaged, wooded 60%. SHORE: Waterfowl hunting in the marshes. NEARSHORE: Sport boating and fishing.	Private 66% and state 34%.	Agricultural.	Low to moderate. Most of the residences are above the 10-foot contour, except one home at the mouth of Tomahund Creek. Here the flood hazard is moderate, critical.	Poor. Most of the subsegment has narrow, strip beaches. There are a few wide beaches, but they are short, restricting any development for recreational usage.	Slight or no change to moderate, noncritical. The area around the mouth of Morris Creek has an historical erosion rate of 2.4 feet per year. Ferry Point and Dancing Point have historical erosion rates ranging from 1.1 to 1.9 feet per year. The remainder of the subsegment appears stable. There are several areas of effective bulkheading southwest of Ferry Point. Dancing Point has several hundred feet of effective rubble riprap.	The state owned lands north of Morris Creek are to be used as public open spaces. The remainder of the subsegment seems best suited for its present rural - agricultural composition.

SUBSEGMENT 1A

DANCING POINT TO LOWER TREES POINT

(Map 2)

EXTENT: 27,200 feet (5.2 mi.) of shoreline from Dancing Point to Lower Trees Point. The subsegment includes 40,800 feet (7.7 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Entirely low shore.
SHORE: Artificially stabilized 5% (0.2 mi.), beach 78% (4.0 mi.), embayed marsh 15% (0.8 mi.), and fringe marsh 2% (0.1 mi.).
NEARSHORE: Narrow 31% and intermediate 69%.

SHORELANDS USE
FASTLAND: Agricultural 82% (6.4 mi.) and unmanaged, wooded 18% (1.4 mi.).
SHORE: Mostly low intensity recreational use.
NEARSHORE: Sport boating and fishing, and commercial shipping leading to Richmond's deep water terminals, and to Hopewell's chemical plants.

WIND AND SEA EXPOSURE: The shoreline trends SE - NW in the subsegment. Fetches at Dancing Point are SE - 2.5 nm, NE - 2.3 nm, and W - 1.7 nm. The fetch at a point 1½ miles northwest of Tettington is SW - 2.0 nm.

OWNERSHIP: Private.

ZONING: Agricultural - rural residential.

FLOOD HAZARD: Moderate, noncritical. The greatest flood hazard here occurs during heavy upstream rains, as in the case of hurricanes Agnes and Camille. No structures are endangered.

BEACH QUALITY: Beaches in the subsegment range in quality from poor to good, the better beaches being around Sandy Point and west of Tettington.

SHORE EROSION SITUATION
EROSION RATE: Slight or no change to moderate, noncritical. The area southeast of Lower Trees Point has an historical erosion rate of 1.1 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is effective riprap around Dancing Point and at Tettington.

OTHER SHORE STRUCTURES: There are two piers in the vicinity of Tettington, one pier having a boat shelter at its end.

SHORE USE LIMITATIONS: Most of the shoreline in this subsegment is actively used for agricultural purposes. These areas usually have gentle sloping elevations of 20 to 25 feet and generally have fair beaches. Access to these areas is adequate, though no major thoroughfare is near. It is expected that most development in the county will continue to take place close to Route 5, which connects Williamsburg to Petersburg and Richmond. Therefore, the shorelands here are not considered prime targets for expansion.

ALTERNATE SHORE USE: The area northwest of Tettington has the potential of being converted into a recreational camping spot. This area has a fairly good sized beach and has reasonable access to Route 5 via Routes 613 and 623. The major drawback here is the economic feasibility. The Holiday Inn campground across the Route 5 bridge in James City County draws the tourist trade to Williamsburg and Jamestown areas. The agricultural lands and several residences in this area would have to be bought in order to establish this type of venture.

Elsewhere, various low intensity recreational activities such as hiking, nature walks, and camping are a possibility.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CLAREMONT, Va. Quadr., 1966;
USGS, 7.5 Min.Ser. (Topo.), BRANDON, Va. Quadr., 1965.
C&GS, #530, 1:40,000 scale, JAMES RIVER, Jamestown Island to Jordan Point, 1971.

PHOTOS: Aerial-VIMS 12Jul74/CC-1A/13-43.

Ground-VIMS 13May76/CC-1A/ 7-15.

SUBSEGMENT 1B

LOWER TREES POINT TO STURGEON POINT,

(Maps 2 and 3)

EXTENT: 38,800 feet (7.3 mi.) of shoreline from Lower Trees Point to Sturgeon Point, including Kennon Creek. The subsegment includes 43,000 feet (8.1 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 4% (0.3 mi.), moderately low shore 79% (6.4 mi.), moderately low shore with bluff 2% (0.2 mi.), moderately high shore 5% (0.4 mi.), moderately high shore with bluff 5% (0.4 mi.), high shore 1% (0.1 mi.), and high shore with bluff 5% (0.4 mi.).
SHORE: Artificially stabilized 2% (0.1 mi.), beach 38% (2.8 mi.), embayed marsh 60% (6.7 mi.), and fringe marsh 1% (0.1 mi.).
NEARSHORE: Narrow 44%. The waters of Kennon Creek are too narrow and shallow to be classified.

SHORELANDS USE
FASTLAND: Entirely unmanaged, wooded. There are no residences within a mile into the fastland in this subsegment, except for several at Trees Point. The area between Kennon Creek and Sturgeon Point has been selected by the county planners as a possible site for industrial development in the future.
SHORE: Mostly unused. Some fishing in the marsh creeks.
NEARSHORE: Commercial shipping to Hopewell and Richmond.

WIND AND SEA EXPOSURE: The shoreline trends SSE - NNW from Lower Trees Point to Kennon Creek, then E - W from Kennon Creek to Sturgeon Point. Fetches at Bachelor Point are S - 3.6 nm, and WNW - 1.5 nm.

OWNERSHIP: Private.

ZONING: Mostly agricultural - rural residential; some light industrial.

FLOOD HAZARD: Moderate, noncritical. Like subsegment 1A, this area's greatest flood hazard comes from the swollen river as a result of inland rains. There are no endangered structures

along the shore.

BEACH QUALITY: Poor. There are thin, strip beaches throughout the subsegment.

SHORE EROSION SITUATION

EROSION RATE: Slight or no change for most of the subsegment. There is moderate, noncritical erosion at Oldfield and Bachelor Point, where the historical rate averages 1.1 to 1.4 feet per year. Erosion here is a result of both boat wakes and rain runoff. Traffic to Richmond and Hopewell often leave considerable wakes in this narrow part of the James River. These wakes contribute to the undermining of the bluffs here. Heavy rains cause washing of the cliff face. Trees, undermined by this washing, eventually fall, carrying with them large amounts of soil.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is approximately 200 feet of effective bulkheading at Sturgeon Point.

OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS: The county has zoned the area between Kennon Creek and Sturgeon Point for light industrial use. The rest of the subsegment is virtually unused. These lands are wooded with the only good access being Route 613, which is generally more than one mile inland. These areas are not considered prime targets for residential or recreational development. These wooded shorelands should be left in their natural state.

ALTERNATE SHORE USE: The area between Kennon Creek and Sturgeon Point has a future potential use as a light industrial site. However, any industry selecting this area should insure against any pollutants or artificial nutrients being added to the environment which would worsen the already precarious state of the upper James River.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHARLES CITY, Va. Quadr., 1965;
USGS, 7.5 Min.Ser. (Topo.), BRANDON, Va. Quadr., 1965.
C&GS, #530, 1:40,000 scale, JAMES RIVER, Jamestown Island to Jordan Point, 1971.

PHOTOS: Aerial-VIMS 12Jul74/CC-1B/44-55.

Ground-VIMS 13May76/CC-1B/16-20.

SUBSEGMENT 1C

STURGEON POINT TO OLDS POINT

(Maps 3 and 4)

EXTENT: 79,400 feet (15.0 mi.) of shoreline from Sturgeon Point to Olds Point, including Tyler, Mapsico, and Kittewan Crreks. The subsegment includes 105,600 feet (20.0 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 55% (11.1 mi.), moderately low shore 42% (8.4 mi.), and moderately high shore with bluff 3% (0.5 mi.).

SHORE: Artificially stabilized 2% (0.3 mi.), beach 12% (1.8 mi.), embayed marsh 45% (6.7 mi.), extensive marsh 25% (3.8 mi.), and fringe marsh 16% (2.4 mi.).

NEARSHORE: Narrow 44% and intermediate 15%. The rest of the shoreline is located in the creeks, which are too narrow and shallow for classification.

SHORELANDS USE

FASTLAND: Agricultural 47% (9.5 mi.), residential 1% (0.2 mi.), and unmanaged, wooded 52% (10.3 mi.).

SHORE: No organized recreational usage. There are several piers in the subsegment showing private, recreational use in those areas. For most of the subsegment, the shore is unused.

NEARSHORE: Some sport fishing and boating, mostly commercial shipping heading to Richmond or Hopewell.

WIND AND SEA EXPOSURE: The shoreline trends NE - SW from Sturgeon Point to the tip of Weyanoke Point, then SE - NW from Weyanoke Point to Olds Point. Fetches at Sturgeon Point are SW - 1.2 nm, at Milton, ESE - 1.5 nm, and at Weyanoke Point, NE - 3.7 nm and NNW - 2.3 nm.

OWNERSHIP: Private.

ZONING: Agricultural - rural residential.

FLOOD HAZARD: As with the previous subsegments, the prime flood hazard is from the flooding river due to upstream rains. One house at Copeland, and one on Kittewan Creek are low enough (below the 5-foot contour) to be seriously endangered by such upstream flooding.

For the rest of the subsegment, the flood hazard is moderate, noncritical.

BEACH QUALITY: Poor. This segment has narrow strip beaches.

SHORE EROSION SITUATION

EROSION RATE: Slight or no change to moderate, noncritical. Historically, the areas of most change have been situated from Kittewan Creek around Weyanoke Point, where erosion has averaged from 1.7 to 1.9 feet per year. The area from Tyler Creek to the Milton light has been eroding at an average of 1.4 feet per year. A small area northwest of Weyanoke Point has been accreting at 1.9 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is one section of effective bulkheading (0.1 mi.) located southeast of Olds Point.

OTHER SHORE STRUCTURES: There are three piers in the subsegment.

SHORE USE LIMITATIONS: Of the 15.0 miles of shoreline found in this subsegment, 8.8 miles are directly bordering the James River. The rest of the shoreline is along the creeks, with Kittewan Creek containing the most mileage. The area is used primarily for agriculture, though 52% is unmanaged woods. Residential use accounts for 1% of the fastland. The main area of agriculture is located on the Weyanoke peninsula. Elevations along the eastern side average 5 feet and along the western side 5 to 10 feet. All available land on the peninsula is actively cultivated. Any type of development would be at the sacrifice of the agriculture.

The lands between Tyler and Mapsico Creeks are totally wooded. The fastland rises to heights of 40 feet about 1,000 feet inland. This area does not have good access and would be costly to develop.

South of Olds Point, there are moderately high bluffs (50 to 60 feet) on the shoreline. The fastland behind is used for agriculture. Bluff areas are susceptible to erosion due to rain runoff. Besides the normal runoff erosion, the wooded nature of the shoreline can accelerate the process. Trees undermined by the erosion eventually fall, carrying with them large amounts of soil. No structures should be built close to the shoreline which is actively eroding.

ALTERNATE SHORE USE: Low. This area is zoned and used for agricultural purposes. County planners have proposed no new development for the subsegment in their projected land use plan. The marsh areas on Weyanoke Point and along the creeks should be preserved in their natural state, as they provide flood and erosion protection as well as being habitats for various aquatic life.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHARLES CITY, Va. Quadr., 1965.
C&GS, #530, 1:40,000 scale, JAMES RIVER, Jamestown Island to Jordan Point, 1971.

PHOTOS: Aerial-VIMS 12Jul74/CC-10/56-84.

SUBSEGMENT 2A

OLDS POINT TO BUCKLAND CREEK

(Map 4)

EXTENT: 55,000 feet (10.4 mi.) of shoreline from Olds Point to Buckland Creek, including Queens Creek and Gunns Run. The subsegment includes 42,600 feet (8.1 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 3% (0.3 mi.), moderately low shore 91% (7.3 mi.), moderately high shore 4% (0.3 mi.), and high shore 2% (0.2 mi.).
SHORE: Beach 13% (1.4 mi.), embayed marsh 55% (5.8 mi.), extensive marsh 13% (1.4 mi.), and fringe marsh 18% (1.9 mi.).
NEARSHORE: Narrow 8% and intermediate 11%. The rest of the shoreline is found along the several creeks in the subsegment, which are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 4% (0.3 mi.), industrial 2% (0.2 mi.), recreational 2% (0.2 mi.), and unmanaged, wooded 91% (7.3 mi.).
SHORE: Mostly unused, except for Wilcox Wharf and the mouth of Buckland Creek where there are several houses. Private recreational usage occurs here.
NEARSHORE: Sport boating and fishing, commercial shipping to Richmond and Hopewell.

WIND AND SEA EXPOSURE: The shoreline trends basically E - W. Fetches at Olds Point are S - 2.8 nm and WSW - 3.3 nm.

OWNERSHIP: Private.

ZONING: Agricultural - rural residential, some light industrial.

FLOOD HAZARD: As with the other segments in Charles City County, flooding of the lowlands is mainly determinant upon inland rains and flooding.

BEACH QUALITY: Poor. The subsegment has thin, strip beaches.

SHORE EROSION SITUATION
EROSION RATE: Slight or no change, except from Olds Point to Queens Creek, where it is moderate, noncritical. This area has an historical erosion rate of 1.5 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS: This area is almost totally unused. Ninety-one percent of the subsegment is unmanaged, wooded. The Queens Creek area has the potential to become a residential and commercial center in the county. Charles City Courthouse, located at the head of Queens Creek, already contains the county government buildings, several country stores, and the county high school. Nearby, there is the New Hope Campground. It would seem logical for more residential and commercial development to occur here. The major drawback to extensive development is the county's lack of public water and sewage. Any area can only accomodate dispersed residential development without such facilities. Other sections of the subsegment do not have good access and development would be costly.

ALTERNATE SHORE USE: Most areas in the subsegment are probably best left undeveloped. The lands at the head of Queens Creek are presently used for some residences and a campground. The close proximity to Charles City Courthouse make these lands valuable for potential residential and commercial development. A public water and sewage system is needed before any such development can materialize. Also, the Wilcox Wharf area, zoned for light industrial use, will probably be developed as such. Other developments in this subsegment are not likely in the near future.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHARLES CITY, Va. Quadr., 1965.
C&GS, #530, 1:40,000 scale, JAMES RIVER, Jamestown Island to Jordan Point, 1971.

PHOTOS: Aerial-VIMS 12Jul74/CC-2A/85-87.

SUBSEGMENT 2B

BUCKLAND CREEK TO HARRISON POINT

(Maps 4, 5 and 6)

EXTENT: 108,200 feet (20.5 mi.) of shoreline from Buckland Creek to the bridge at Harrison Point, including Herring Creek. The subsegment includes 92,400 feet (17.5 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 67% (11.8 mi.), moderately low shore 24% (4.1 mi.), and moderately high shore 9% (1.6 mi.).
SHORE: Artificially stabilized 1% (0.2 mi.), beach 22% (4.4 mi.), embayed marsh 44% (8.9 mi.), extensive marsh 9% (1.9 mi.), and fringe marsh 24% (5.0 mi.).
NEARSHORE: Narrow 36%. The rest of the shoreline is in the creeks, which are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 61% (10.6 mi.), industrial 1% (0.2 mi.), recreational 3% (0.5 mi.), residential 6% (1.1 mi.), and unmanaged, wooded 29% (5.1 mi.). Included in the recreational usage of this subsegment are two historical plantations, "Berkeley" and "Westover", which are located on the shoreline and are tourist attractions.
SHORE: Some waterfowl hunting in the creek marshes; mostly unused.
NEARSHORE: Sport fishing and boating, commercial shipping to Richmond and Hopewell.

WIND AND SEA EXPOSURE: The shoreline in this subsegment trends basically E - W. Fetches at Bucklers Point are ENE - 2.2 nm and SW - 1.8 nm.

OWNERSHIP: Private.

ZONING: Agricultural - rural residential.

FLOOD HAZARD: Moderate, noncritical. Flooding along the river is confined to times when heavy rains occur upriver causing lowland flooding.

BEACH QUALITY: Poor to fair. Most beaches in the subsegment are thin, strip beaches. The beach just east of Benjamin Harrison Bridge is considered fair, being of greater width than the

other beaches. The area from Westover to Berkeley has pebble beaches, usually with vegetation.

SHORE EROSION SITUATION
EROSION RATE: Slight or no change, except at Bucklers Point, where the rate is moderate, non-critical, having an historical erosion rate of 1.1 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is approximately 1,000 feet of bulkhead at Westover. The old ferry dock further upstream has cement bag bulkheading which is still effective.

OTHER SHORE STRUCTURES: There are two piers southeast of Charles Lake. There are also the remains of a ferry dock just east of the bridge.

SHORE USE LIMITATIONS: The county's future land use plans express the conviction that any future development should be in harmony with the county's natural resource location, especially with its historic landmarks. Two fine plantations are located in this subsegment, thus restricting to a significant degree any development in the immediate locality. Extensive and embayed marsh areas, which comprise 53% of the county's shoreline, should not be tampered with.

ALTERNATE SHORE USE: As already stated, any development along the shoreline should be in harmony with the area's natural resources. In this subsegment, further development should be confined to low density housing at various locations. The primary use of the shorelands should remain agricultural or rural in character.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHARLES CITY, Va. Quadr., 1965;
USGS, 7.5 Min.Ser. (Topo.), WESTOVER, Va. Quadr., 1965.
C&GS, #530, 1:40,000 scale, JAMES RIVER, Jamestown Island to Jordan Point, 1971.

PHOTOS: Aerial-VIMS 12Jul74/CC-2B/88-107.

Ground-VIMS 13May76/CC-2B/21-29.

SEGMENT 3

BENJAMIN HARRISON BRIDGE TO TURKEY ISLAND CREEK

(Map 6)

EXTENT: 81,000 feet (15.3 mi.) of shoreline from Benjamin Harrison Bridge to 10,400 feet toward the head of Turkey Island Creek. The measurement includes Eppes Creek. The subsegment includes 64,700 feet (12.3 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 64% (7.8 mi.), moderately low shore 28% (3.4 mi.), moderately high shore 1% (0.2 mi.), and moderately high shore with bluff 7% (0.9 mi.).
SHORE: Beach 6% (0.9 mi.), embayed marsh 7% (1.0 mi.), extensive marsh 24% (3.7 mi.), and fringe marsh 63% (9.7 mi.).
NEARSHORE: Narrow 19% and intermediate 29%. The rest of the shoreline is composed of creeks which are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 68% (8.3 mi.), recreational 2% (0.2 mi.), and unmanaged, wooded 30% (3.7 mi.).
SHORE: Mostly unused with some waterfowl hunting along Eppes Island marsh.
NEARSHORE: Sport fishing and boating for the entire length of the segment. Commercial shipping up the James to Shirley Plantation. Here ships use the Turkey Island cutoff.

WIND AND SEA EXPOSURE: The shoreline trends basically ENE - WSW from the bridge to the west corner of Eppes Island, then S - N to Turkey Island Creek. Fetches at the bridge at Harrison Point are ESE - 3.9 nm and SW - 4.0 nm.

OWNERSHIP: Private.

ZONING: Agricultural - rural residential.

FLOOD HAZARD: Moderate, noncritical, except critical for one house in Eppes Marsh. Flooding occurs here due to heavy upstream rains.

BEACH QUALITY: Poor. There is a narrow, fringe beach throughout the subsegment.

SHORE EROSION SITUATION
EROSION RATE: Slight or no change. According to an unpublished VIMS report, this area has remained relatively stable over the past 100 years. The area just south of Turkey Island Creek has been accreting at a rate of 3.7 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: Several piers past Shirley Plantation.

SHORE USE LIMITATIONS: The area around Shirley Plantation should not be altered in a way which would contrast with the historical nature of the section. Eppes Island is surrounded by an extensive marsh which should not be altered. The subsegment is basically rural agricultural in character, which would be costly to change.

ALTERNATE SHORE USE: No development is planned for this subsegment, according to the county's comprehensive plan. The rural nature of this section should be preserved where possible. Development should be limited to low density housing in some areas and possibly some low intensity recreational areas for hiking, camping, and picnicking.

MAPS: USGS, 7.5 Min.Ser. (Topo.), WESTOVER, Va. Quadr., 1965;
USGS, 7.5 Min.Ser. (Topo.), HOPEWELL, Va. Quadr., 1969;
USGS, 7.5 Min.Ser. (Topo.), DUTCH GAP, Va. Quadr., 1969.
C&GS, #530, 1:40,000 scale, JAMES RIVER, Jamestown Island to Jordan Point, 1971;
C&GS, #531, 1:20,000 scale, JAMES RIVER, Jordan Point to Richmond, 1971.

PHOTOS: Aerial-VIMS 12Jul74/CC-3/108-138.

SUBSEGMENT 4A

MATAHUNK NECK TO WATTS POINT,

(Maps 7 and 8)

EXTENT: 46,600 feet (8.8 mi.) of shoreline on the Chickahominy River from the dam at Matahunk Neck to Watts Point. The subsegment includes 49,000 feet (9.3 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 61% (5.7 mi.), moderately low shore 33% (3.1 mi.), and high shore 5% (0.5 mi.).
SHORE: Embayed marsh 70% (6.1 mi.), extensive marsh 9% (0.8 mi.), and fringe marsh 21% (1.9 mi.).
NEARSHORE: Intermediate 9%. The rest of the river is too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 29% (2.7 mi.), residential 2% (0.2 mi.), and unmanaged, wooded 69% (6.4 mi.).
SHORE: Waterfowl hunting in the marsh areas. The shore is mostly unused.
NEARSHORE: Sport fishing and boating.

WIND AND SEA EXPOSURE: The shoreline in this subsegment trends NW - SE.

OWNERSHIP: Private.

ZONING: Agricultural.

FLOOD HAZARD: Low, noncritical. The many meanders in the Chickahominy River in this subsegment plus the narrow width of the river here keep currents moderate and wind at a minimum. All of the residences here are above the 5-foot contour.

BEACH QUALITY: There are no beaches in the subsegment.

SHORE EROSION SITUATION
EROSION RATE: No historical record. The area appears stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS: The Charles City Comprehensive Plan has denoted marshes as conserved areas, excluding them and any land in the flood plains from residential or commercial development. Embayed and extensive marshes comprise 79% of the segment's shoreline. Also, the Chickahominy River has been proposed as a Scenic River. Development along the river should be in harmony with the natural resources found there. Development of the fastland is also greatly hampered by the lack of access to the subsegment.

ALTERNATE SHORE USE: Low. Most of the shorelands will probably remain unmanaged, wooded areas. The Chickahominy River is a popular fishing area, though most fishing occurs above the dam on Matahunk Neck. A possible use of one section of shoreland would be a camping area near the dam, in the vicinity of Graves Landing. Other, low intensity recreational sites could accompany this facility.

MAPS: USGS, 7.5 Min.Ser. (Topo.), WALKERS, Va. Quadr., 1965;
USGS, 7.5 Min.Ser. (Topo.), BRANDON, Va. Quadr., 1965.
C&GS, #530, 1:40,000 scale, JAMES RIVER, Jamestown Island to Jordan Point, 1971.

PHOTOS: Aerial-VIMS-None.

SUBSEGMENT 4B

WATTS POINT TO EAGLE BOTTOM MARSH

(Maps 7, 8 and 9)

EXTENT: 48,000 feet (9.1 mi.) of shoreline from Watts Point to Eagle Bottom Marsh. The subsegment includes 76,000 feet (14.4 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 28% (4.0 mi.), moderately low shore 63% (9.1 mi.), moderately high shore 5% (0.7 mi.), and high shore 4% (0.6 mi.).
SHORE: Artificially stabilized 1% (0.1 mi.), embayed marsh 3% (0.3 mi.), extensive marsh 55% (5.0 mi.), and fringe marsh 41% (3.7 mi.).
NEARSHORE: Narrow 88% and intermediate 12%.

SHORELANDS USE
FASTLAND: Agricultural 8% (1.2 mi.), commercial 1% (0.1 mi.), preserved 7% (1.1 mi.), residential 8% (1.2 mi.), and unmanaged, wooded 76% (10.9 mi.).
SHORE: Waterfowl hunting in the marsh areas. Elsewhere, the shore is used for access to the water around Mount Airy and is mostly unused for the remainder of the subsegment.
NEARSHORE: Sport boating and fishing, and some bathing near the shore.

WIND AND SEA EXPOSURE: The shoreline trends NW - SE with meanders for approximately 50% of the subsegment, then N - S for the rest of the subsegment. The fetch at Parsons Island is S - 5 nm.

OWNERSHIP: Private and some state.

ZONING: Agricultural.

FLOOD HAZARD: Moderate, noncritical, except in several places along the shore where residences appear to be below the 5-foot contour. There, the flood hazard is moderate, critical.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION
EROSION RATE: No data from Watts Point to the pier southwest of Old Neck. For the rest of

the subsegment, the rate ranges from slight or no change to severe, noncritical. The area of greatest erosion has been around Old Neck Creek, where the historical rate is 4.5 feet per year. There are several areas of moderate, noncritical erosion in the subsegment.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are two areas having a total of 200 feet of effective bulkhead. A hundred feet of rubble riprap is located near Old Neck. This structure is also effective at combatting boat wake erosion.

OTHER SHORE STRUCTURES: Numerous piers, mostly located between Watts Point and Mount Airy.

SHORE USE LIMITATIONS: The state has recently acquired a large area of land on the Chickahominy River, part of which is located in this subsegment. This preserved land is to be developed for low intensity recreational use. Other use or development is precluded from this area.

Fifty-eight percent of the shoreline in this subsegment is either embayed or extensive marsh. No development is possible for these conserved areas. The shoreline near Mount Airy has sloping bluffs of 25 to 50 feet which can be eroded by heavy rains. Also, there are numerous residences already located in the vicinity. Any development should be in harmony with the rural nature of the Chickahominy River.

ALTERNATE SHORE USE: The only section which has the potential for future development is the shoreline around Mount Airy. This area already has numerous structures on the shore, most being vacation residences. Additional structures built one to two hundred feet into the fastland would not adversely affect the area if care is taken to prohibit sewage discharge into the river. Elsewhere, there is a low potential for any development.

MAPS: USGS, 7.5 Min.Ser. (Topo.), BRANDON, Va. Quadr., 1965.
C&GS, #530, 1:40,000 scale, JAMES RIVER, Jamestown Island to Jordan Point, 1971.

PHOTOS: Aerial-VIMS 5May76/CC-4B/142-169.

SUBSEGMENT 4C

EAGLE BOTTOM MARSH TO DANCING POINT

(Maps 9 and 10)

EXTENT: 156,550 feet (29.6 mi.) of shoreline from Eagle Bottom Marsh to Dancing Point. The subsegment includes 209,000 feet (39.6 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 31% (12.4 mi.), moderately low shore 65% (25.8 mi.), and high shore 3% (1.4 mi.).
SHORE: Artificially stabilized 2% (0.6 mi.), beach 10% (2.9 mi.), embayed marsh 62% (18.3 mi.), and fringe marsh 26% (7.8 mi.).
NEARSHORE: Narrow 9%, intermediate 7%, and wide 11%. The rest of the shoreline is located on Morris and Tomahund Creeks.

SHORELANDS USE
FASTLAND: Agricultural 13% (5.3 mi.), preserved 25% (10.1 mi.), residential 1% (0.3 mi.), and unmanaged, wooded 60% (23.9 mi.).
SHORE: Waterfowl hunting in the marshes. Elsewhere, walking and fishing from the piers.
NEARSHORE: Sport boating and fishing.

WIND AND SEA EXPOSURE: The shoreline trends first N - S (along the Chickahominy River), then NE - SW for the rest of the subsegment (along the James River). The fetch at the mouth of Morris Creek is SSE - 1.7 nm and at Ferry Point S - 3.2 nm.

OWNERSHIP: Private 66% and state 34%.

ZONING: Agricultural.

FLOOD HAZARD: Low to moderate, noncritical for most of the subsegment. There is a moderate flood hazard in the subsegment when heavy inland rains raise the water level of the James River and also, to a lesser degree, the Chickahominy River. Residences along the rivers are all above the 10-foot contour, except for one residence at the mouth of Tomahund Creek. Here, the flood hazard is moderate, critical.

BEACH QUALITY: Poor to fair. Most of the beaches in the subsegment are poor, strip beaches along the shore fringe. There are, however, several fair beaches in the subsegment of moderate width. The short length of these beaches prohibits any development of the areas for recreational usage.

SHORE EROSION SITUATION
EROSION RATE: Slight or no change to moderate, noncritical. Historically, the area of most change has been at the mouth of Morris Creek where the rate is 2.4 feet per year. Areas of lesser erosion are around Ferry Point and Dancing Point, where the historical erosion rate ranges from 1.1 to 1.9 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is almost 3,000 feet of protective structures in this subsegment. The area southwest of Ferry Point has several areas of effective bulkhead. Dancing Point has several hundred feet of effective riprap.

OTHER SHORE STRUCTURES: There are numerous piers and the Route 5 bridge over the Chickahominy River in this subsegment.

SHORE USE LIMITATIONS: The Virginia Commission of Game and Inland Fisheries has recently acquired 1,497 acres of land on the Chickahominy River. It is located on the north bank of Morris Creek, excluding that area from the mouth of the creek north 1 mile on the river and almost 2 miles on the creek. This preserved section is to be developed into a public recreational area. Plans include a public boat ramp, camping, hiking, and nature trails in both the fastland and the marshes. Other development in this section is prohibited.

The existing residences around the bridge and at Dancing Point would make it difficult for further development to occur there. The lands from During Point to Dancing Point are all actively used for agriculture. These lands usually have 5 to 7 foot elevations near the shore and would not be good sites for development. Access to the area is also difficult.

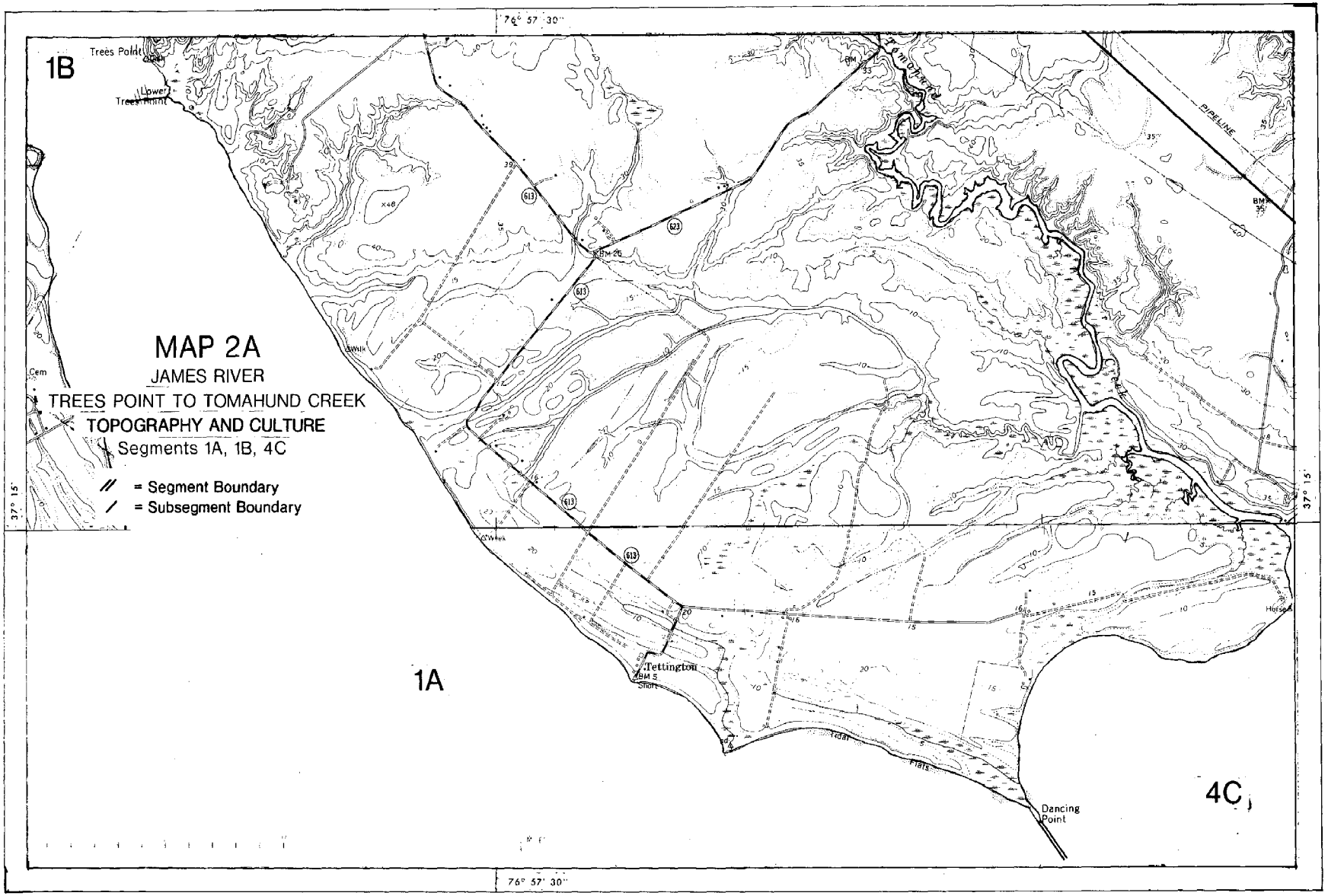
ALTERNATE SHORE USE: The state-owned lands north of Morris Creek are to be used for public recreation, e.g., picnicking, hiking and camping. Other areas in the subsegment may have some individual residential development, though no major build-up is forseen. The area seems best

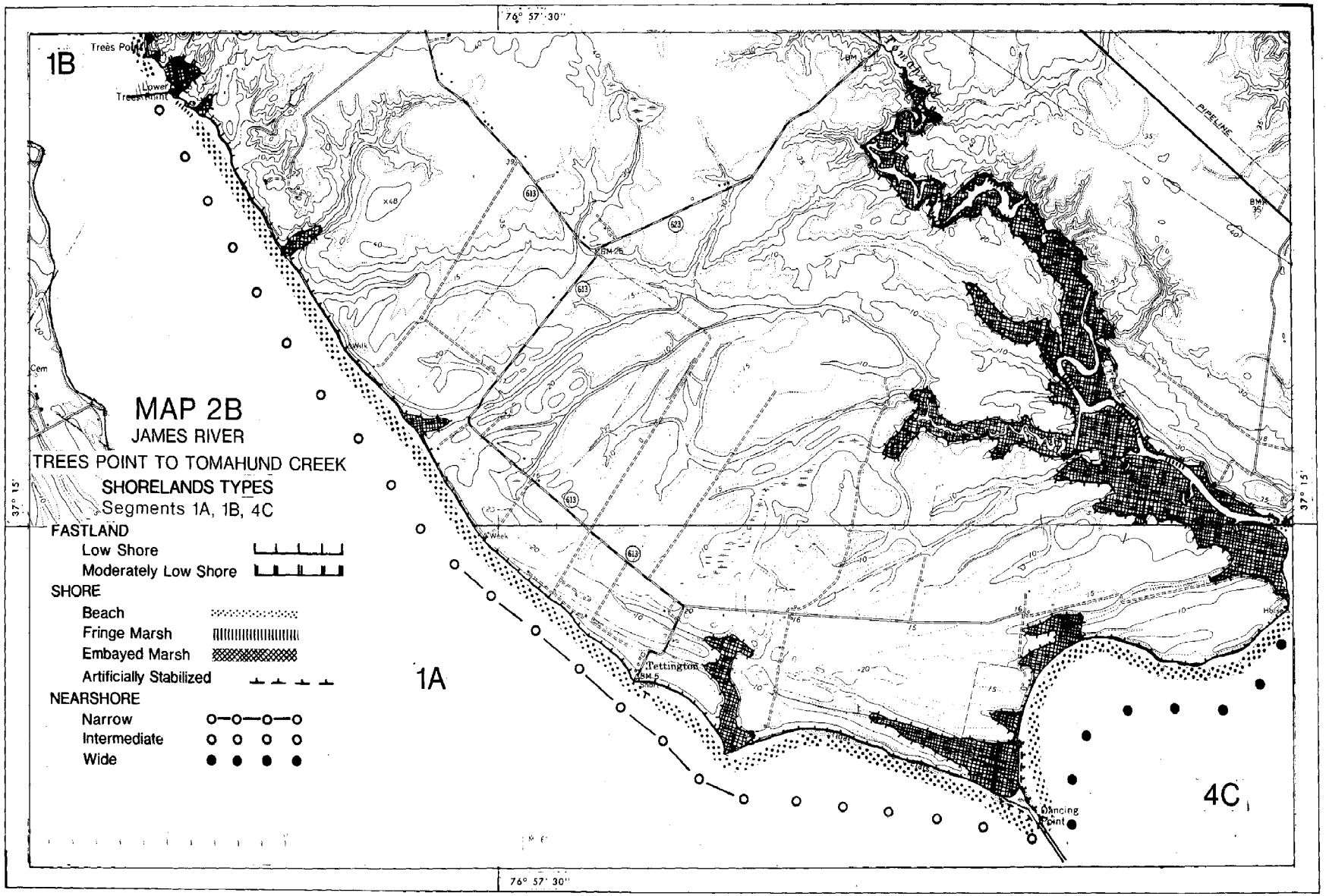
suited for its present rural agricultural composition.

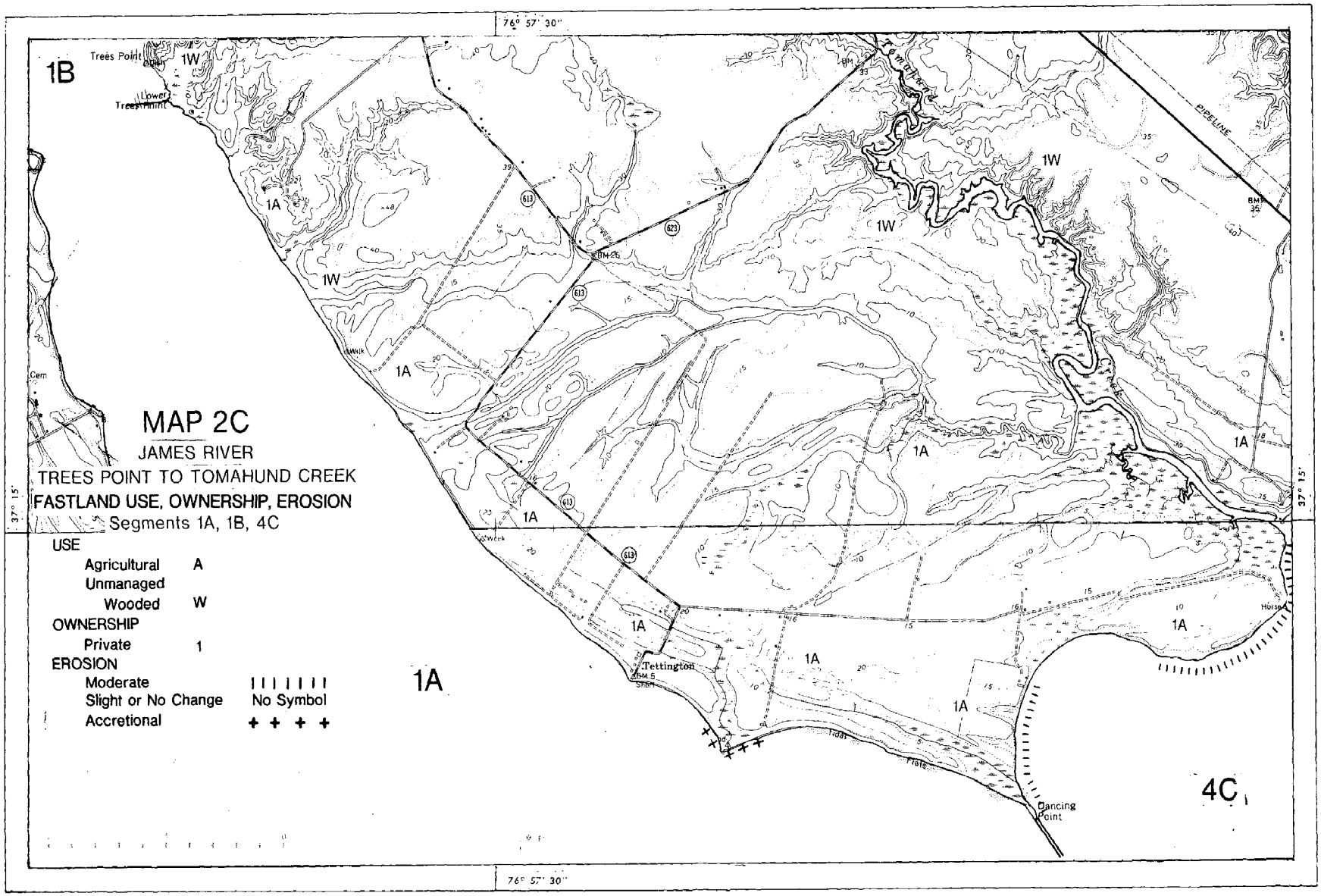
MAPS: USGS, 7.5 Min.Ser. (Topo.), BRANDON, Va. Quadr., 1965;
USGS, 7.5 Min.Ser. (Topo.), CLAREMONT, Va. Quadr., 1966.
C&GS, #530, 1:40,000 scale, JAMES RIVER, Jamestown Island to Jordan Point, 1971.

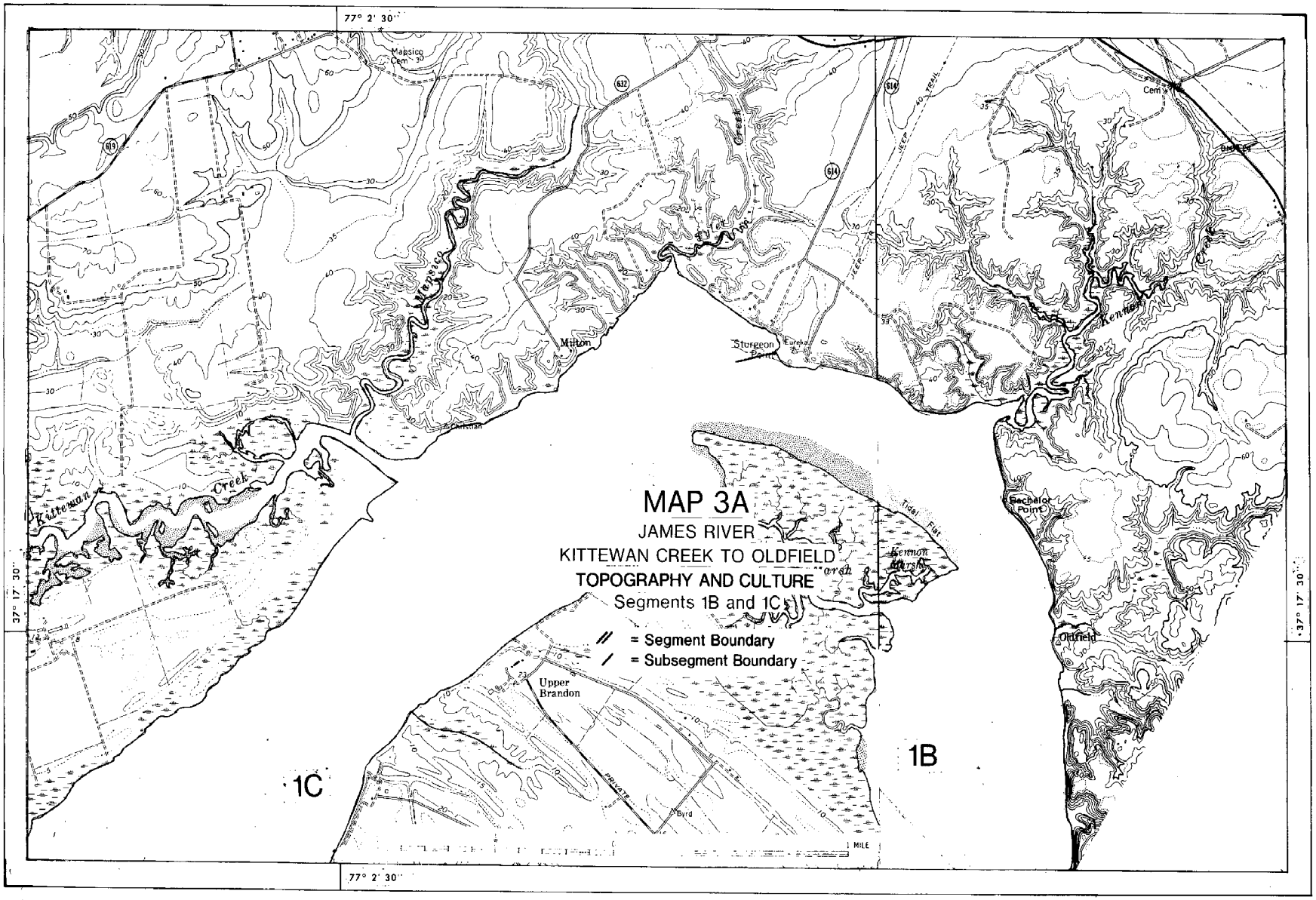
PHOTOS: Aerial-VIMS 12Jul74/CC-4C/ 1- 12;
25Jun76/CC-4C/171-204.

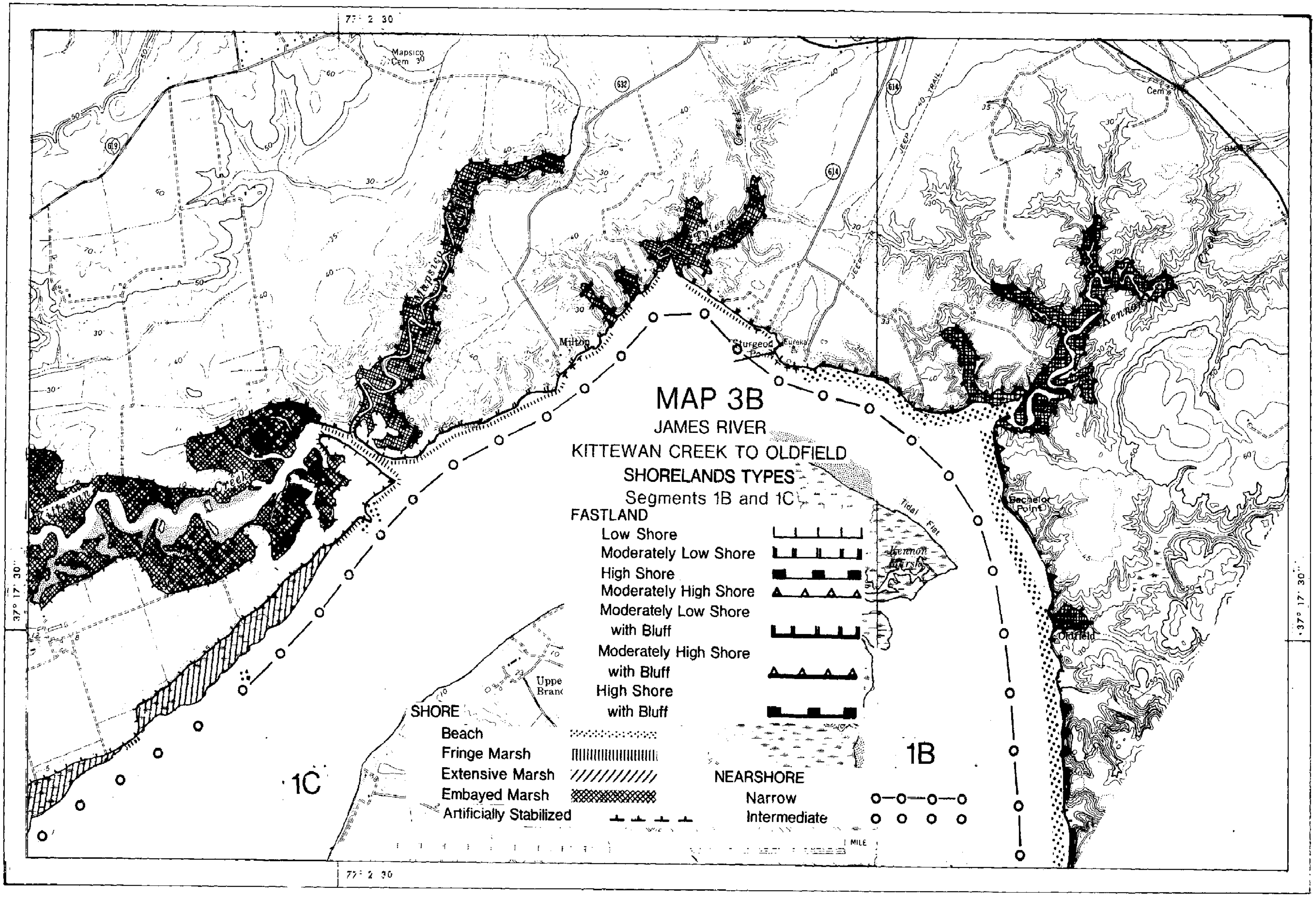
Ground-VIMS 13Apr76/CC-4C/ 1- 6.

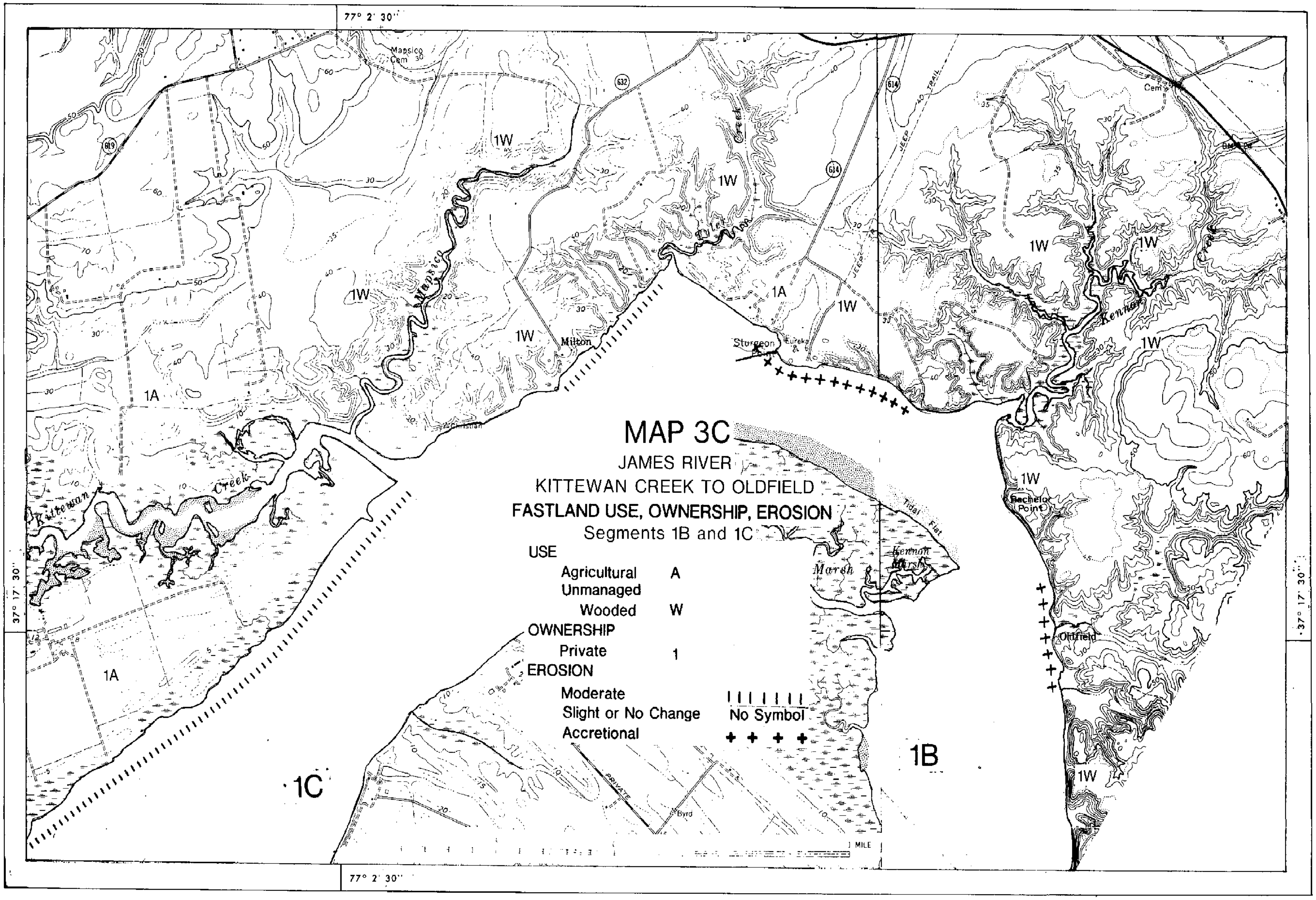

1B
MAP 2A
JAMES RIVER
TREES POINT TO TOMAHUND CREEK
TOPOGRAPHY AND CULTURE
Segments 1A, 1B, 4C
= Segment Boundary
= Subsegment Boundary
1A
4C
76° 57' 30"
37° 15'
Trees Point
Lower Trees Point
Tettington
Dancing Point
PIPELINE

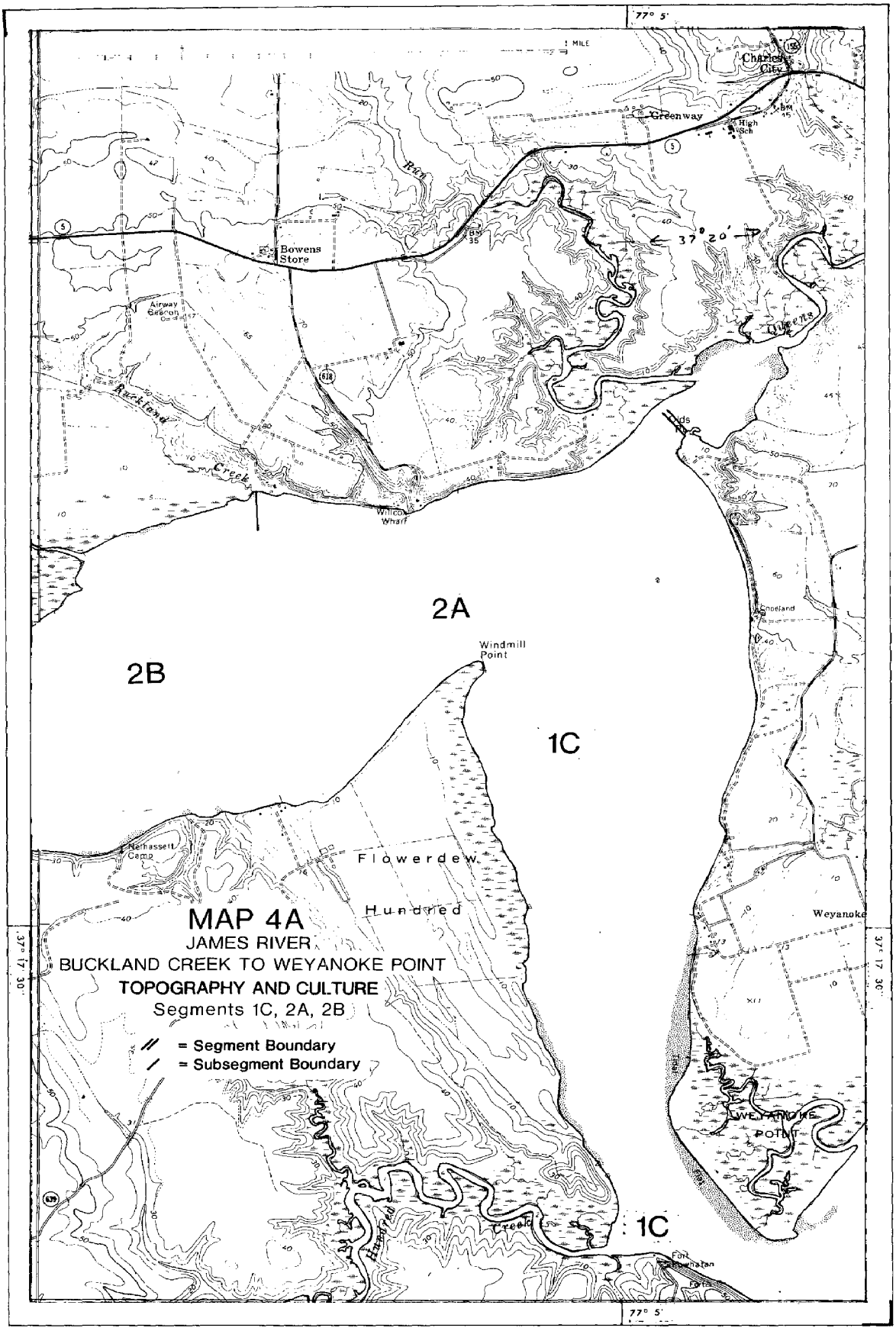

1B
Trees Point
Lower Treest Point
76° 57' 30"
37° 15'
MAP 2B
JAMES RIVER
TREES POINT TO TOMAHUND CREEK
SHORELANDS TYPES
Segments 1A, 1B, 4C
FASTLAND
Low Shore
Moderately Low Shore
SHORE
Beach
Fringe Marsh
Embayed Marsh
Artificially Stabilized
NEARSHORE
Narrow
Intermediate
Wide
1A
Tettington
4C
Dancing Point
PIPELINE
76° 57' 30"

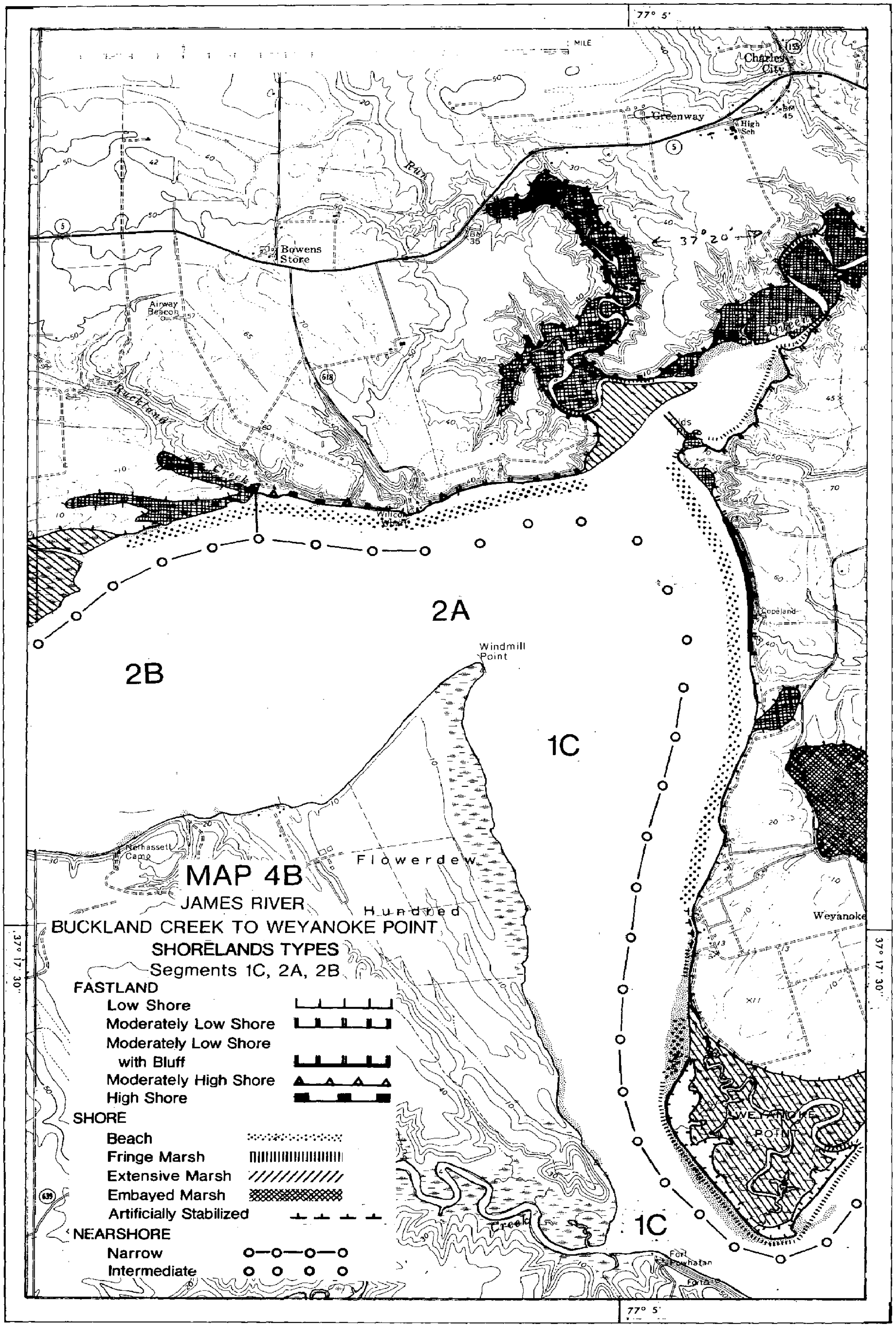

MAP 2C
JAMES RIVER
TREES POINT TO TOMAHUND CREEK
FASTLAND USE, OWNERSHIP, EROSION
Segments 1A, 1B, 4C
USE
Agricultural A
Unmanaged
Wooded W
OWNERSHIP
Private 1
EROSION
Moderate
Slight or No Change No Symbol
Accretional
1B
1A
1W
4C
Trees Point
Lower Trees Point
Tettington
Dancing Point
PIPELINE
76° 57' 30"
37° 15'

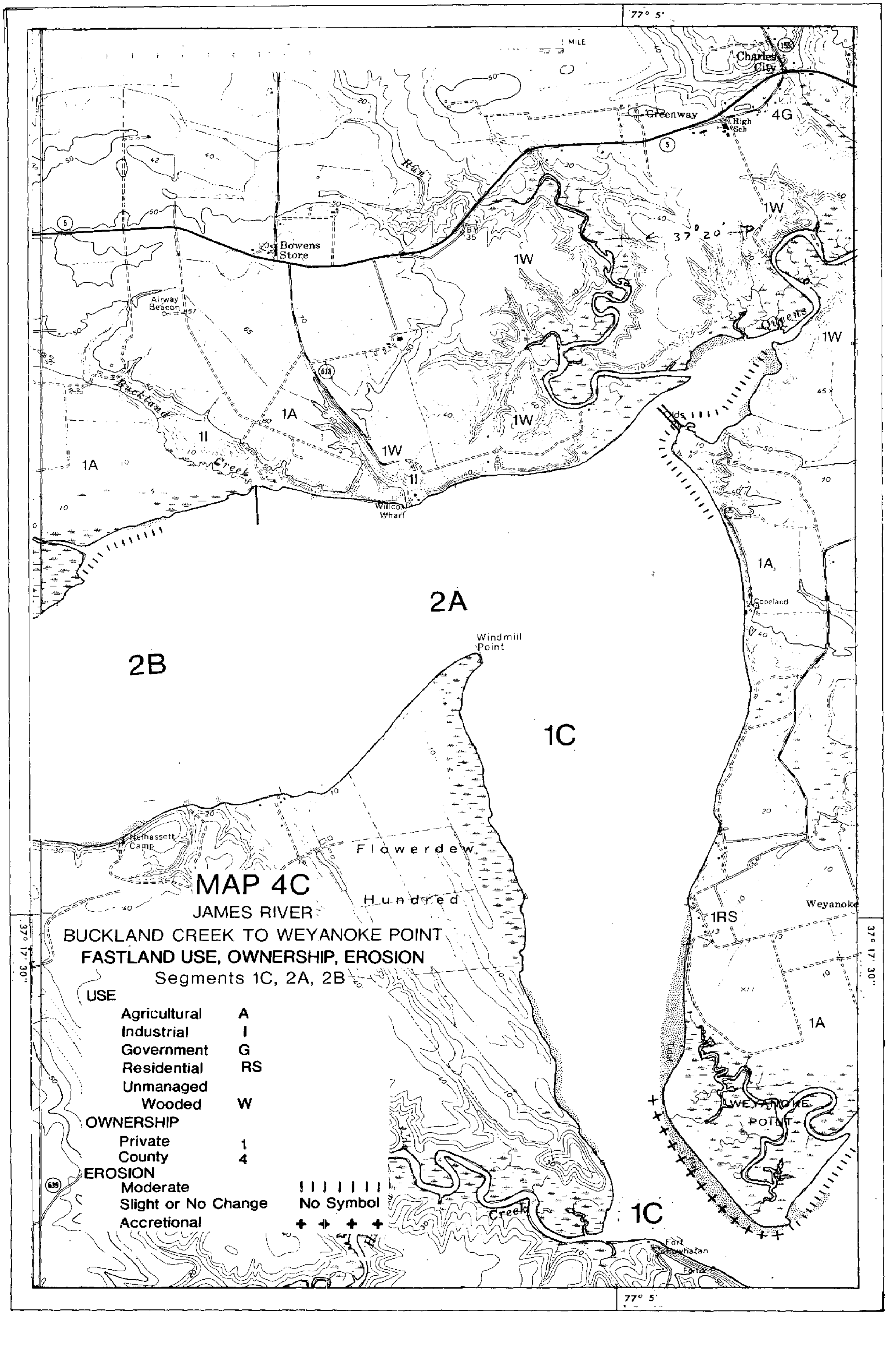

77° 2' 30"
37° 17' 30"
MAP 3A
JAMES RIVER
KITTEWAN CREEK TO OLDFIELD
TOPOGRAPHY AND CULTURE
Segments 1B and 1C
// = Segment Boundary
/ = Subsegment Boundary
1C
1B
Kittewan Creek
Milton
Sturgeon Point
Eureka
Tidal Flat
Bachelor Point
Oldfield
Upper Brandon
PRIVATE
Byrd
1 MILE

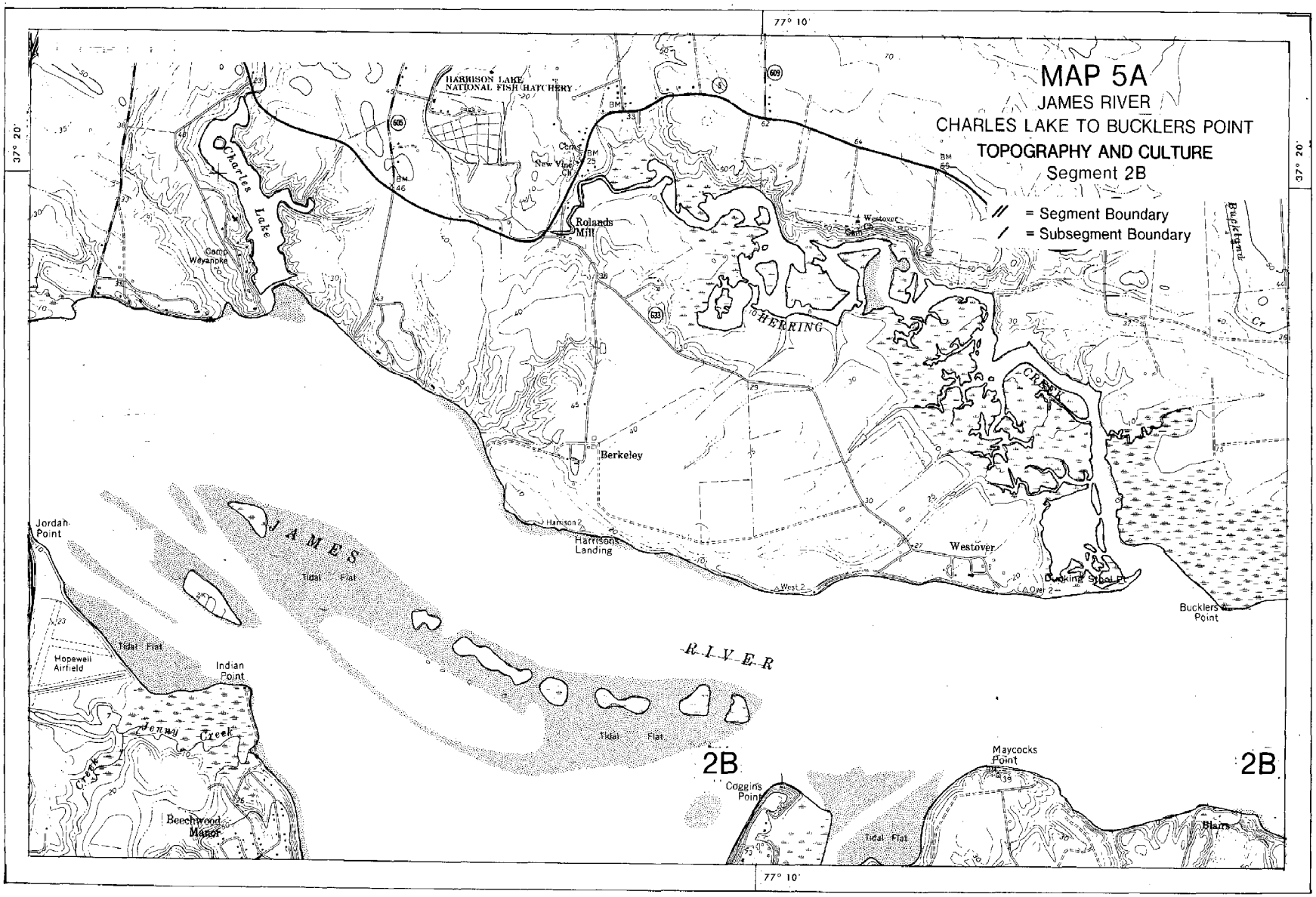

MAP 3B
JAMES RIVER
KITTEWAN CREEK TO OLDFIELD
SHORELANDS TYPES
Segments 1B and 1C
FASTLAND
Low Shore
Moderately Low Shore
High Shore
Moderately High Shore
Moderately Low Shore with Bluff
Moderately High Shore with Bluff
High Shore with Bluff
SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
Artificially Stabilized
NEARSHORE
Narrow
Intermediate
1B
1C
MILE
Mapsico Cem
Milton
Sturgeon Point
Eureka
Tidal Flat
Kennon Marsh
Bachelor Point
Oldfield
Kennon
Cem
37° 17' 30"
77° 2' 30"

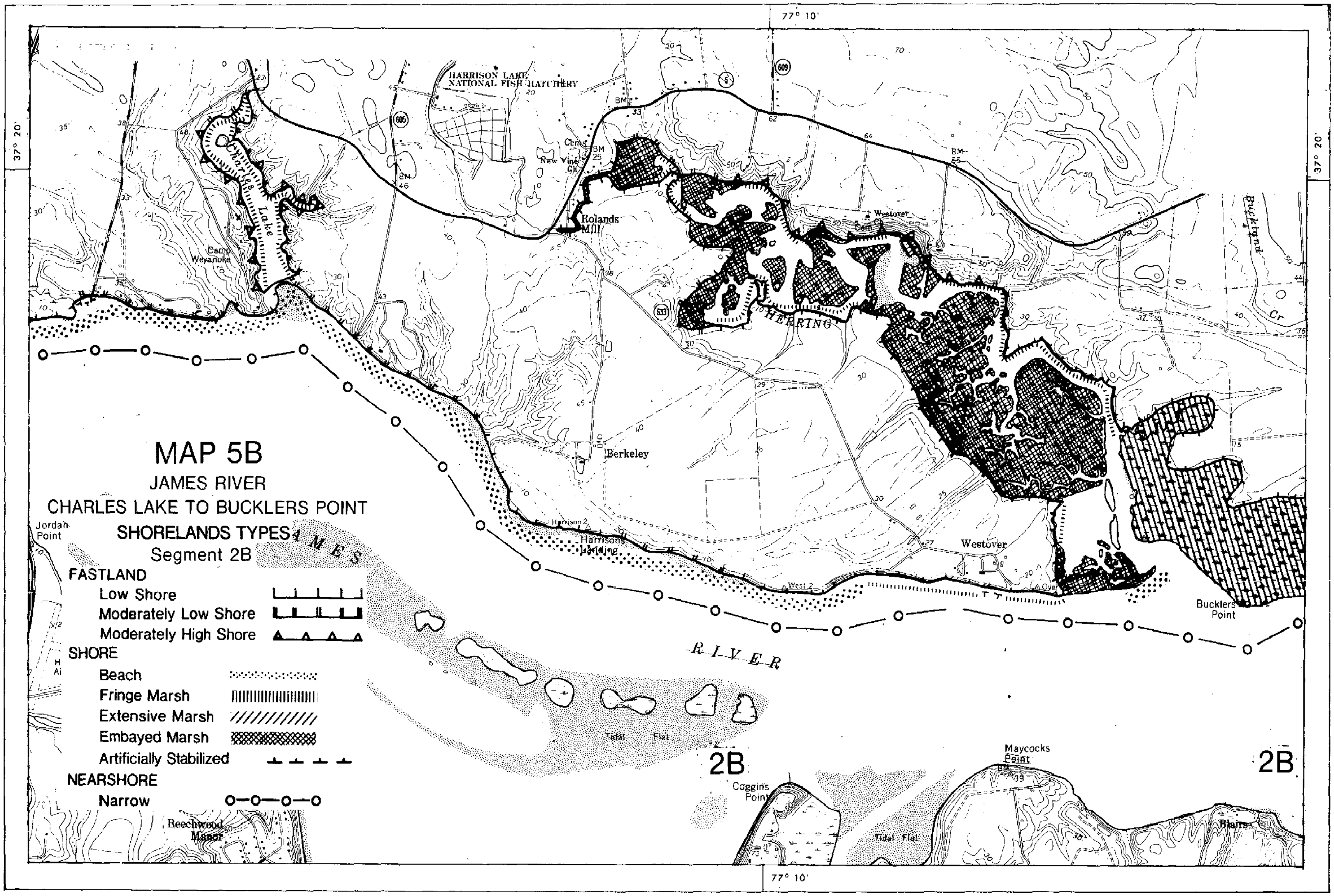

MAP 3C
JAMES RIVER
KITTEWAN CREEK TO OLDFIELD
FASTLAND USE, OWNERSHIP, EROSION
Segments 1B and 1C
USE
Agricultural A
Unmanaged Wooded W
OWNERSHIP
Private 1
EROSION
Moderate
Slight or No Change No Symbol
Accretional + + + +
1A
1W
1B
1C
Milton
Sturgeon
Oldfield
Bachelor Point
Kennon Marsh
Tidal Flat
Kittewan Creek
77° 2' 30"
37° 17' 30"
1 MILE

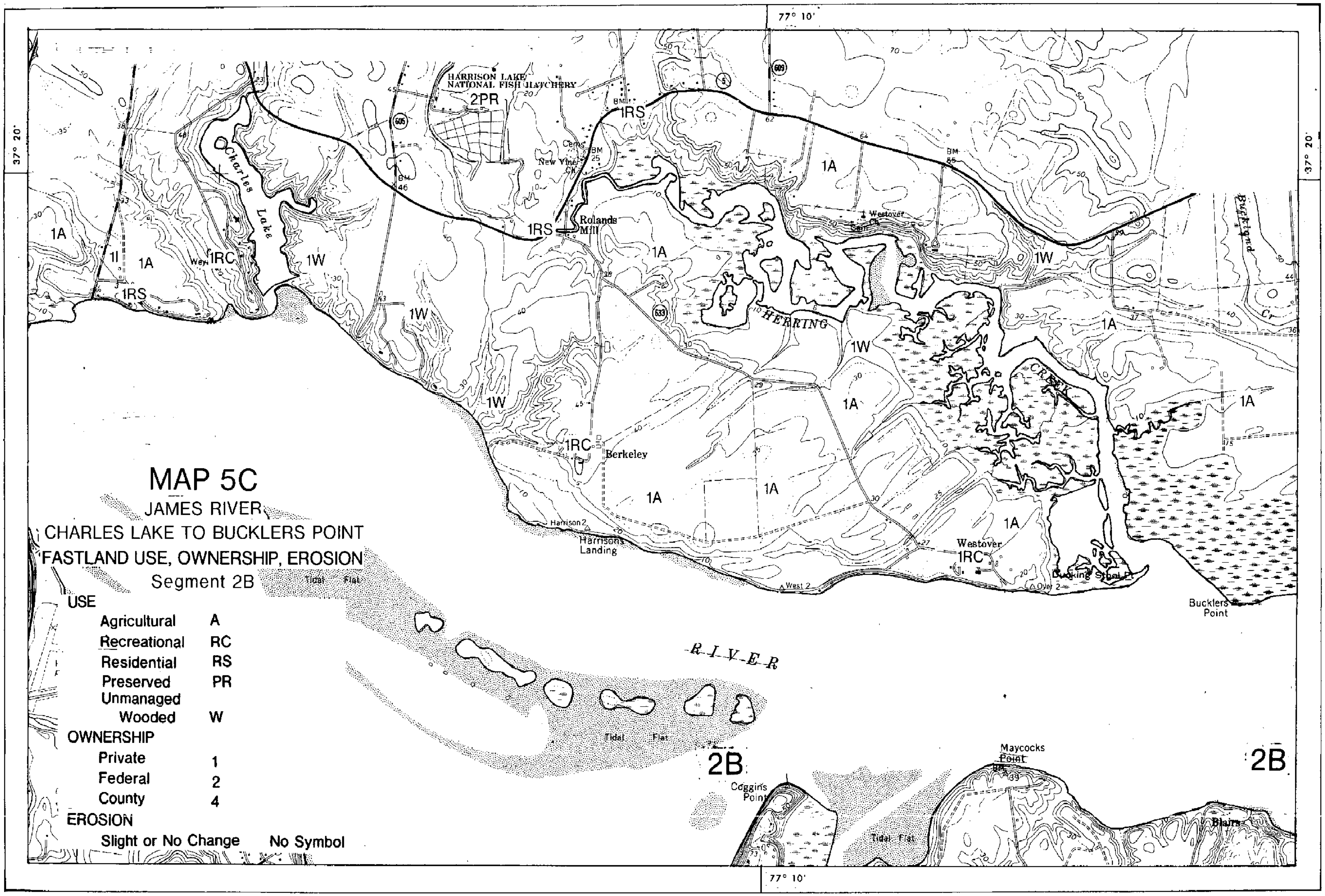

77° 5'
1 MILE
Charles City
Greenway
High Sch
Bowens Store
Airway Beacon
Buckland Creek
Wilcox Wharf
Shadeland
2A
2B
1C
Windmill Point
Flowerdew Hundred
Harrassett Camp
Weyanoke
WEYANOKE POINT
Herring Creek
Fort Powhatan
37° 17' 30"
MAP 4A
JAMES RIVER
BUCKLAND CREEK TO WEYANOKE POINT
TOPOGRAPHY AND CULTURE
Segments 1C, 2A, 2B
= Segment Boundary
= Subsegment Boundary

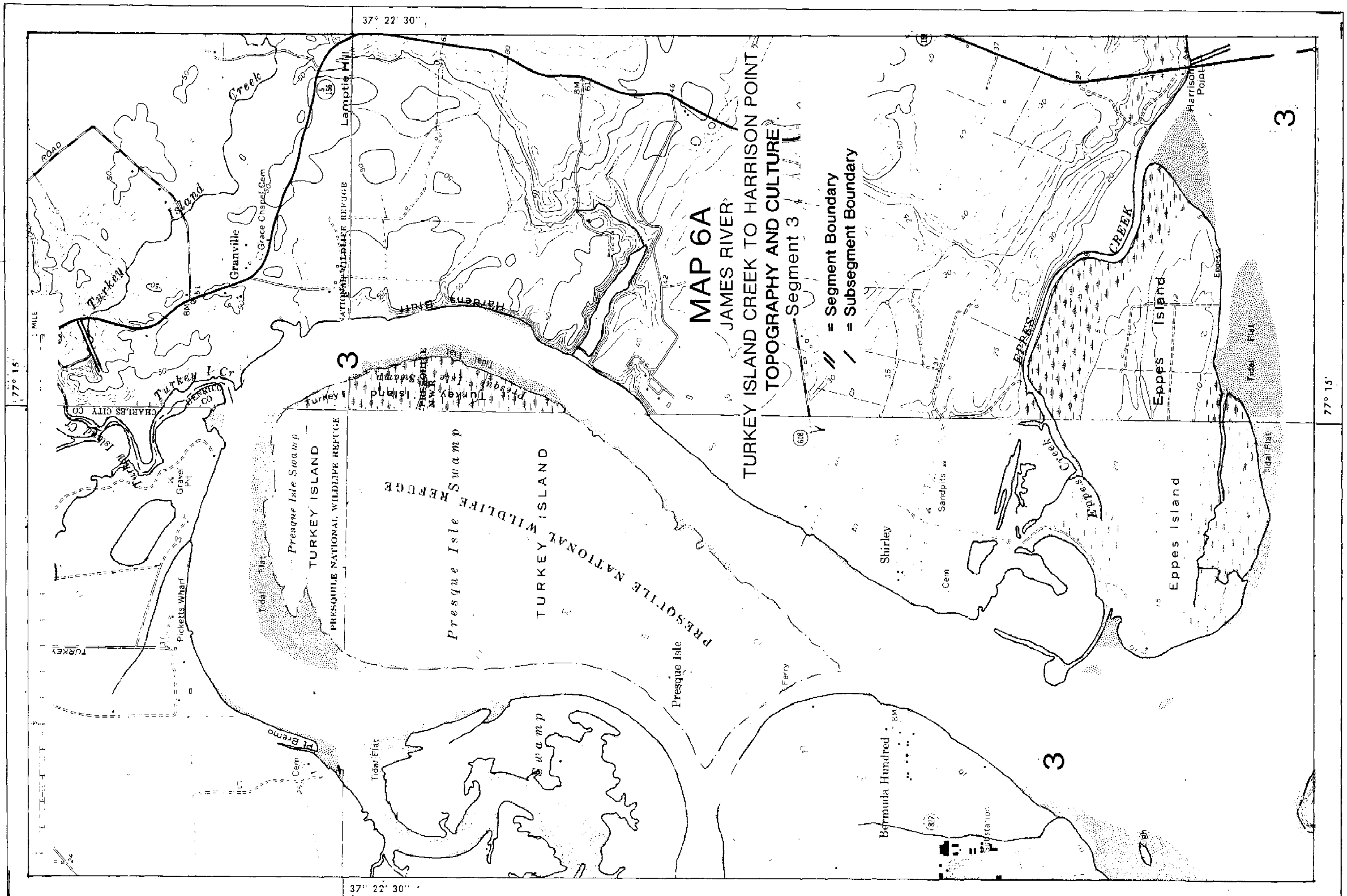

MAP 4B
JAMES RIVER
BUCKLAND CREEK TO WEYANOKE POINT
SHORELANDS TYPES
Segments 1C, 2A, 2B
FASTLAND
Low Shore
Moderately Low Shore
Moderately Low Shore with Bluff
Moderately High Shore
High Shore
SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
Artificially Stabilized
NEARSHORE
Narrow
Intermediate
2A
2B
1C
1C
Windmill Point
Flowerdew Hundred
Weyanoke
Weyanoke Point
Charles City
Greenway
Bowens Store
Airway Beacon
Buckland Creek
Queens Creek
Copeland
Fort Powhatan
37° 20'
37° 17' 30"
77° 5'
MILE

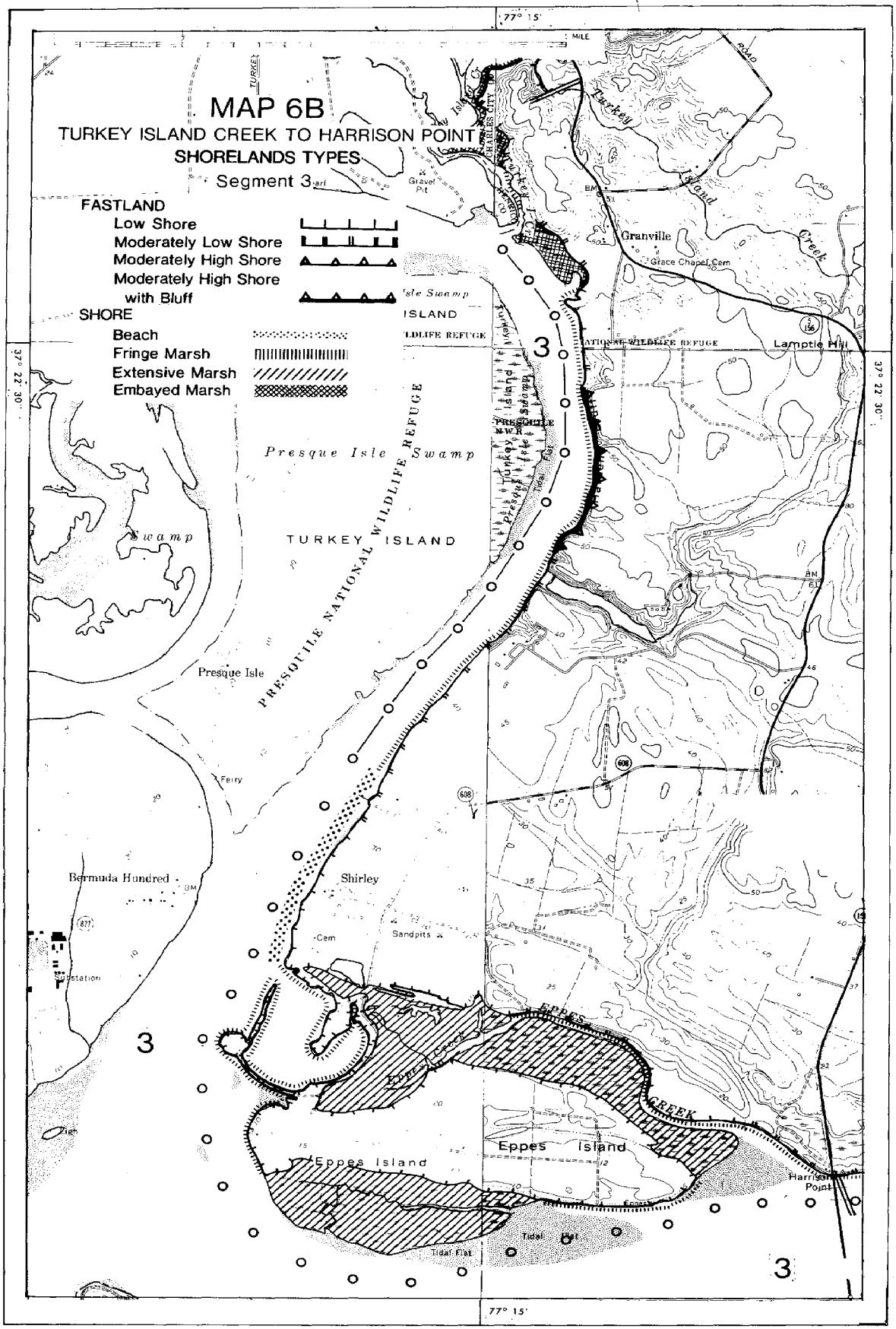

MAP 4C
JAMES RIVER
BUCKLAND CREEK TO WEYANOKE POINT
FASTLAND USE, OWNERSHIP, EROSION
Segments 1C, 2A, 2B
USE
Agricultural A
Industrial I
Government G
Residential RS
Unmanaged
Wooded W
OWNERSHIP
Private 1
County 4
EROSION
Moderate
Slight or No Change No Symbol
Accretional
2A
2B
1C
1C
1A
1I
1W
1W
1W
1W
1I
1A
4G
1W
1A
1RS
1A
Charles City
Greenway
Bowens Store
Airway Beacon
Buckland Creek
Queens
Wilcox Wharf
Windmill Point
Copeland
Flowerdew Hundred
Methassett Camp
Weyanoke
WEYANOKE POINT
Fort Powhatan
77° 5'
37° 17' 30"
37° 20'

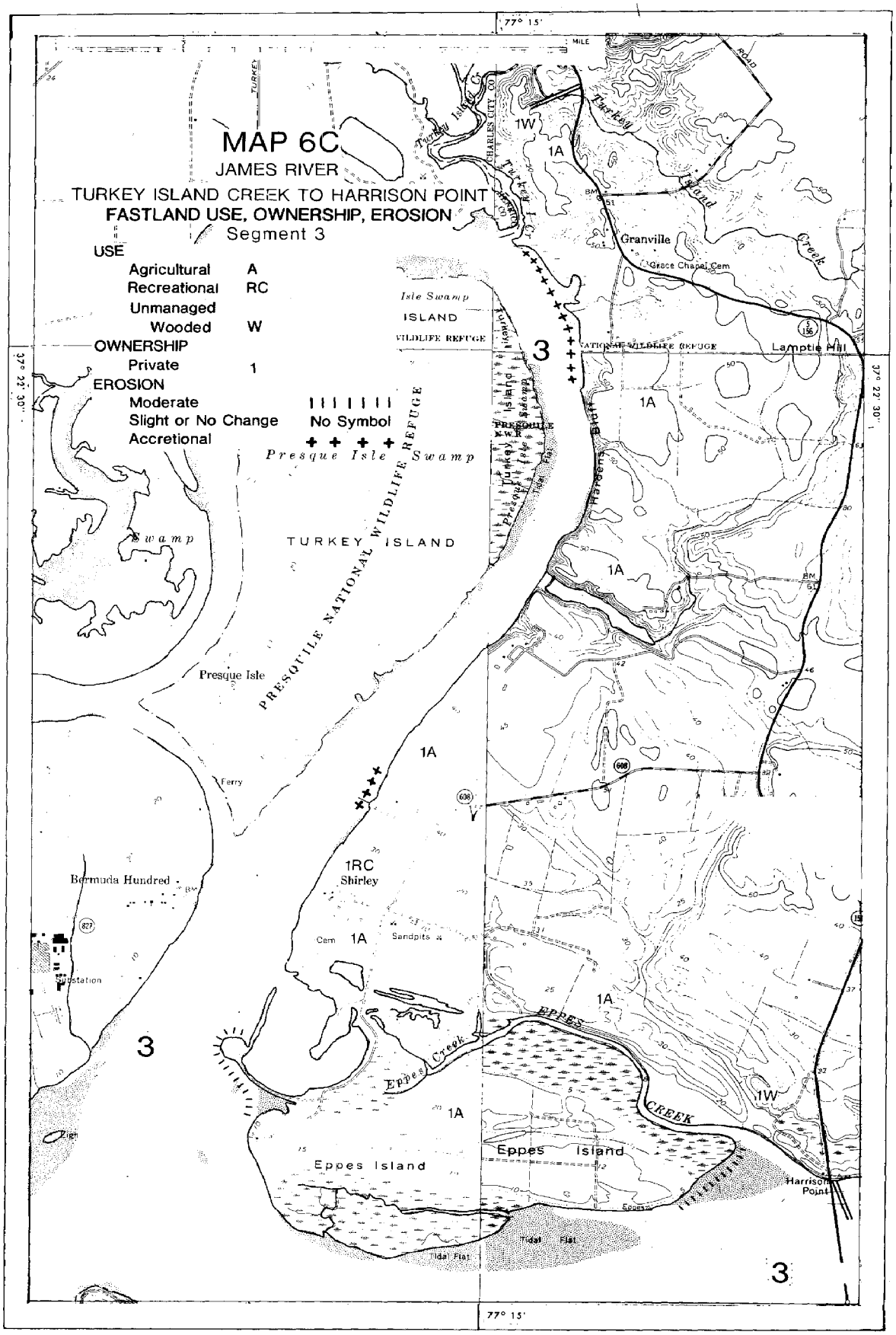

MAP 5A
JAMES RIVER
CHARLES LAKE TO BUCKLERS POINT
TOPOGRAPHY AND CULTURE
Segment 2B
// = Segment Boundary
/ = Subsegment Boundary
77° 10'
37° 20'
HARRISON LAKE NATIONAL FISH HATCHERY
Charles Lake
Camp Wayanoke
Rolands Mill
Berkeley
HERRING
CREEK
Harrisons Landing
Westover
Buckingham Slough
Bucklers Point
Jordan Point
JAMES
Tidal Flat
RIVER
Hopewell Airfield
Indian Point
Beechwood Manor
Coggins Point
Maycocks Point
Blairs
2B

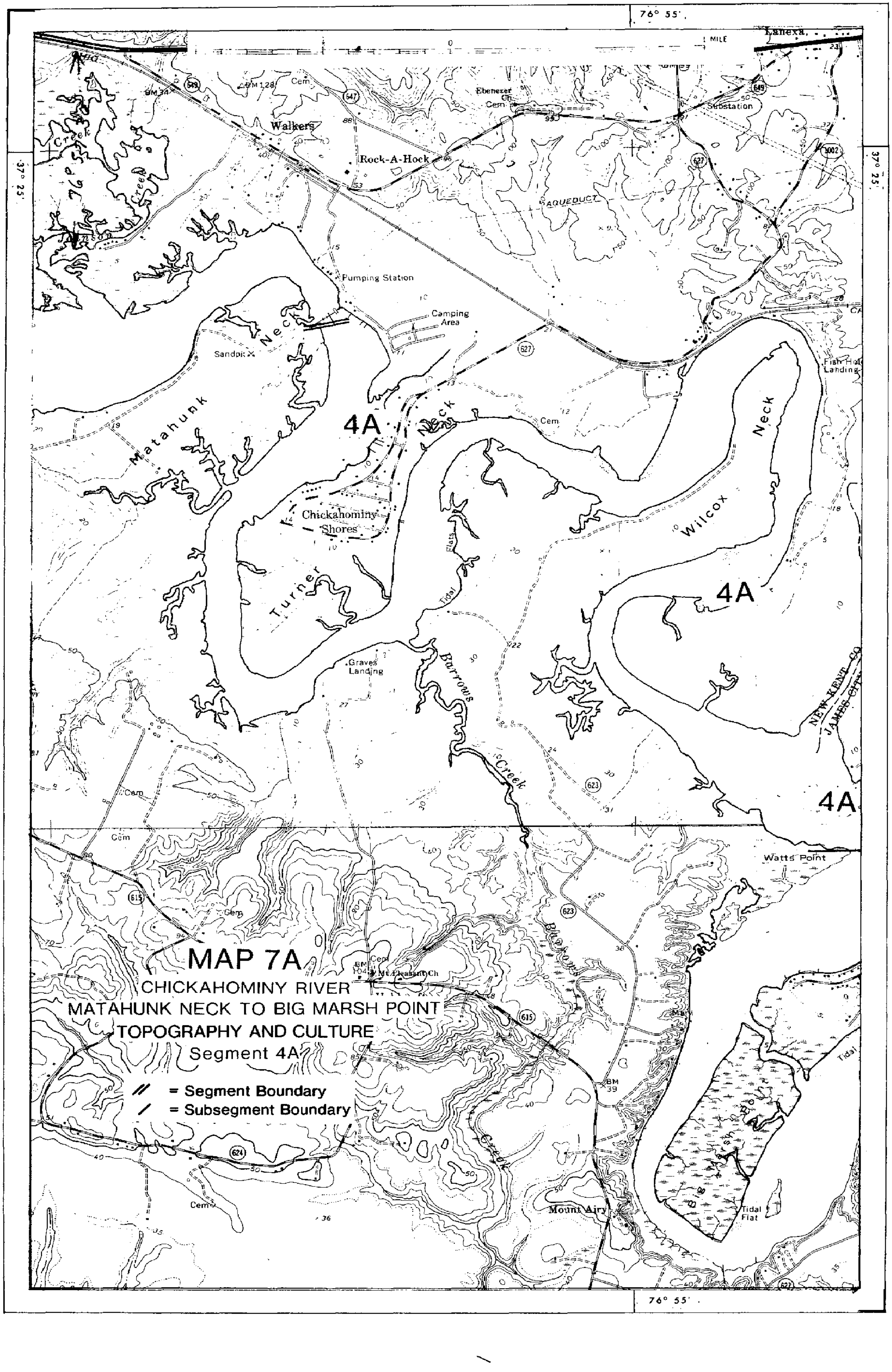

MAP 5B
JAMES RIVER
CHARLES LAKE TO BUCKLERS POINT
SHORELANDS TYPES
Segment 2B
FASTLAND
Low Shore
Moderately Low Shore
Moderately High Shore
SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
Artificially Stabilized
NEARSHORE
Narrow
77° 10'
37° 20'
HARRISON LAKE NATIONAL FISH HATCHERY
Charles Lake
Camp Weyanoke
Rolands Mill
Berkeley
Harrison Landing
Westover
HERRING
Herring Cr
Buckland
Westover Ch
JAMES
RIVER
Jordan Point
Bucklers Point
Tidal Flat
2B
Coggins Point
Maycocks Point
Beechwood Manor
2B

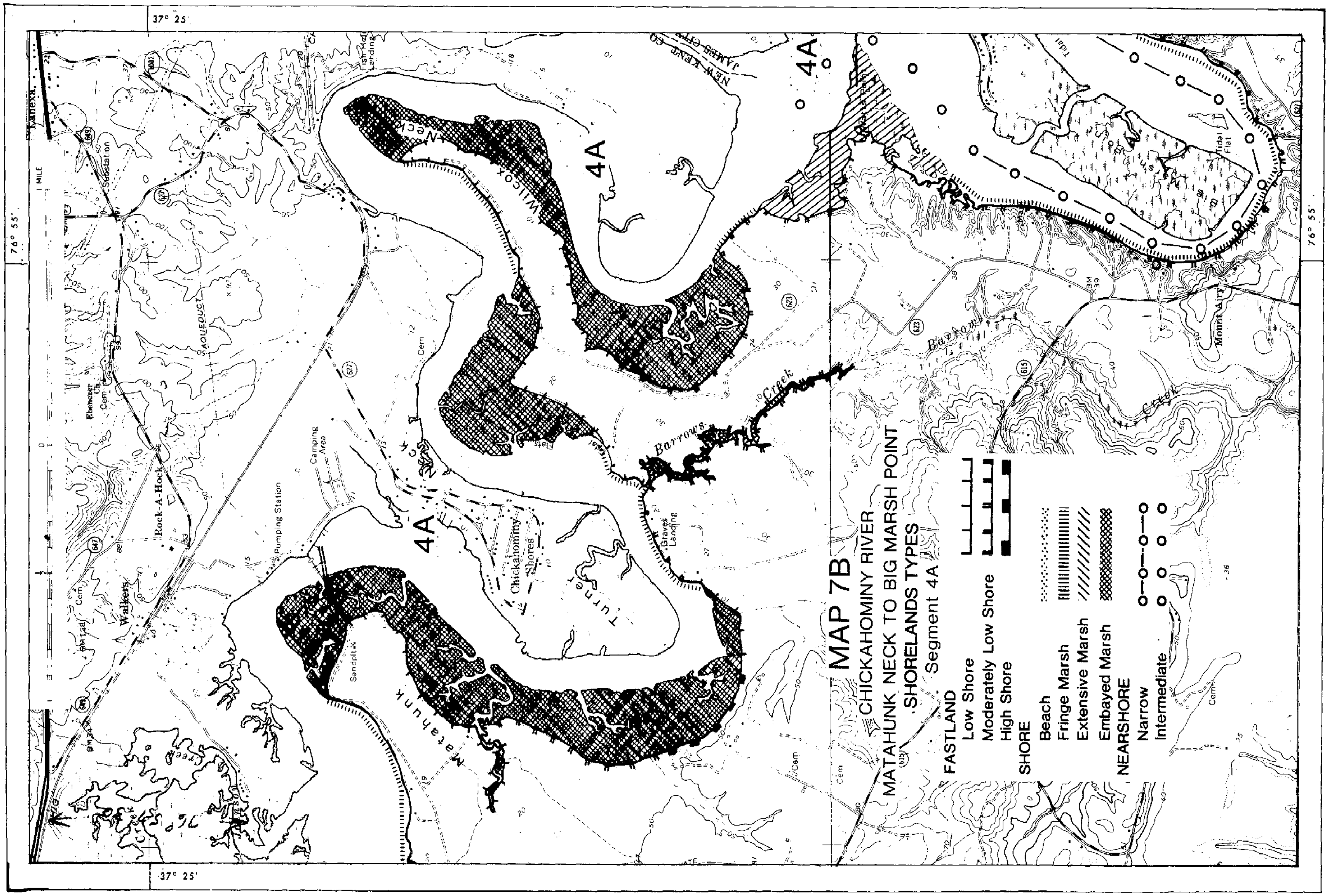

MAP 5C
JAMES RIVER
CHARLES LAKE TO BUCKLERS POINT
FASTLAND USE, OWNERSHIP, EROSION
Segment 2B
USE
Agricultural A
Recreational RC
Residential RS
Preserved PR
Unmanaged Wooded W
OWNERSHIP
Private 1
Federal 2
County 4
EROSION
Slight or No Change No Symbol
77° 10'
37° 20'
HARRISON LAKE NATIONAL FISH HATCHERY
Charles Lake
Rolands Mill
New Vine Ch
Westover Sch
HERRING CREEK
Berkeley
Harrisons Landing
Westover
Ducking Stool Pt
Bucklers Point
RIVER
Tidal Flat
Maycocks Point
Coggins Point
2PR
1RS
1A
1I
1RC
1W
2B

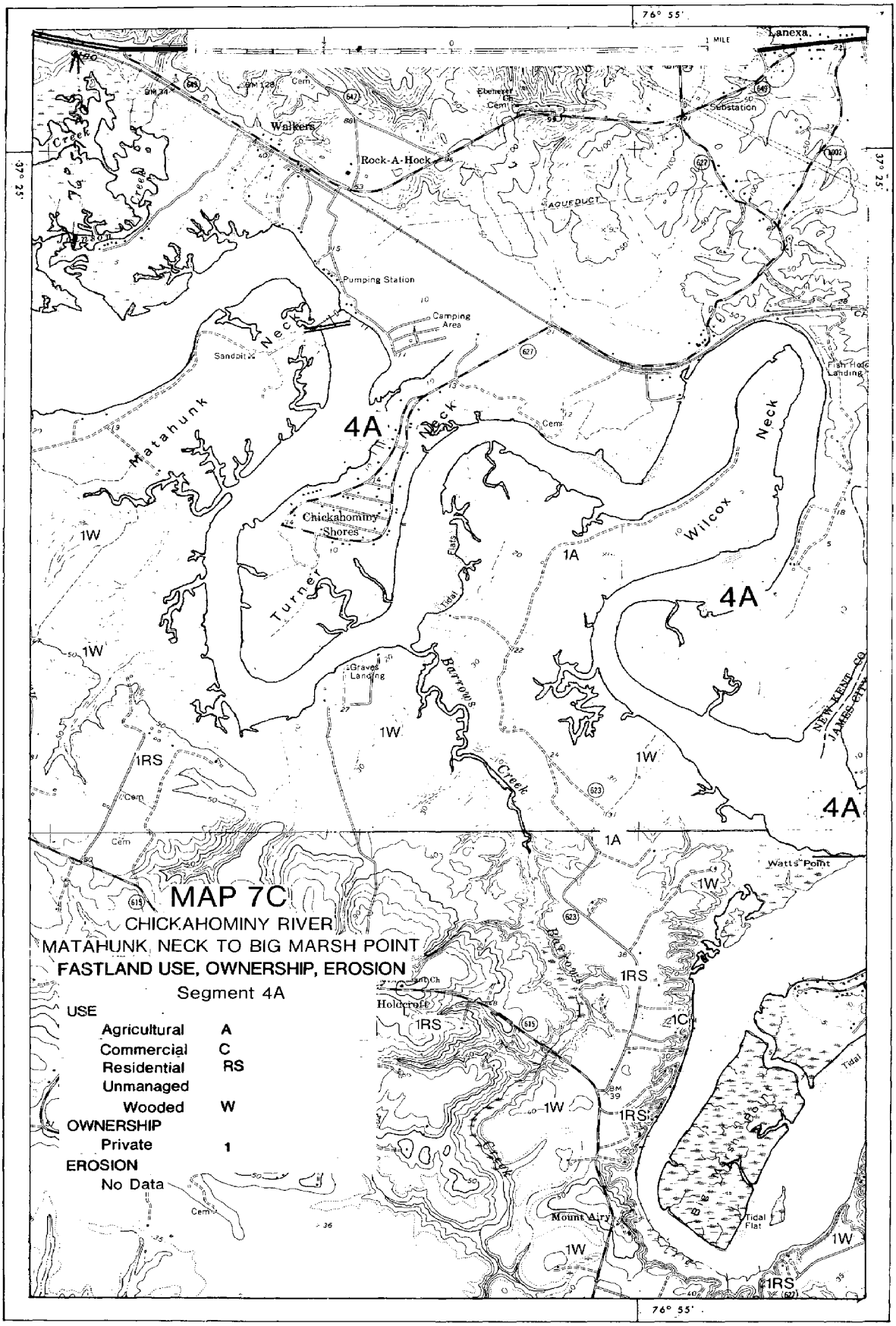

MAP 6A
JAMES RIVER
TURKEY ISLAND CREEK TO HARRISON POINT
TOPOGRAPHY AND CULTURE
Segment 3
// = Segment Boundary
/ = Subsegment Boundary
37° 22' 30"
77° 15'
Turkey Island Creek
Granville
Grace Chapel Cem
Lamptie Hill
Hardens Bluff
Turkey I. Cr
CHARLES CITY CO
HENRICO CO
Gravel Pit
Pickett's Wharf
Presque Isle Swamp
TURKEY ISLAND
PRESQUILE NATIONAL WILDLIFE REFUGE
Presque Isle Swamp
Presque Isle
Ferry
Tidal Flat
Pt Bremo
Cem
Swamp
Shirley
Sandpits
Cem
Bermuda Hundred
EPPES CREEK
Eppes Island
Eppes Creek
Harrison Point
3

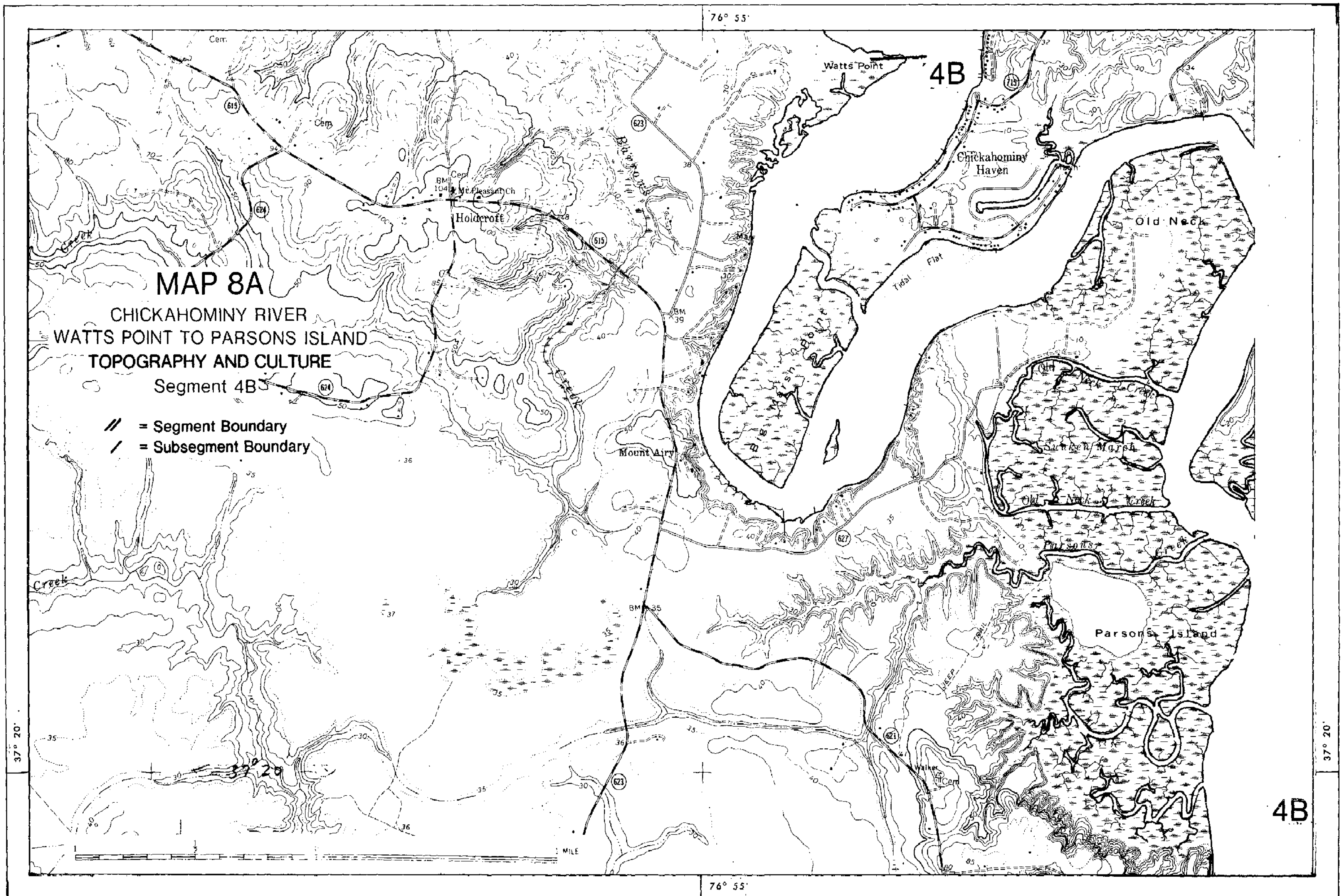

MAP 6B
TURKEY ISLAND CREEK TO HARRISON POINT
SHORELANDS TYPES
Segment 3
FASTLAND
Low Shore
Moderately Low Shore
Moderately High Shore
Moderately High Shore with Bluff
SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
77° 15'
37° 22' 30"
Presque Isle Swamp
TURKEY ISLAND
PRESQUILE NATIONAL WILDLIFE REFUGE
Granville
Grace Chapel Cem
Lamptie Hill
Presque Isle
Ferry
Bermuda Hundred
Shirley
Cem
Sandpits
Eppes Island
Tidal Flat
Harrison Point
3

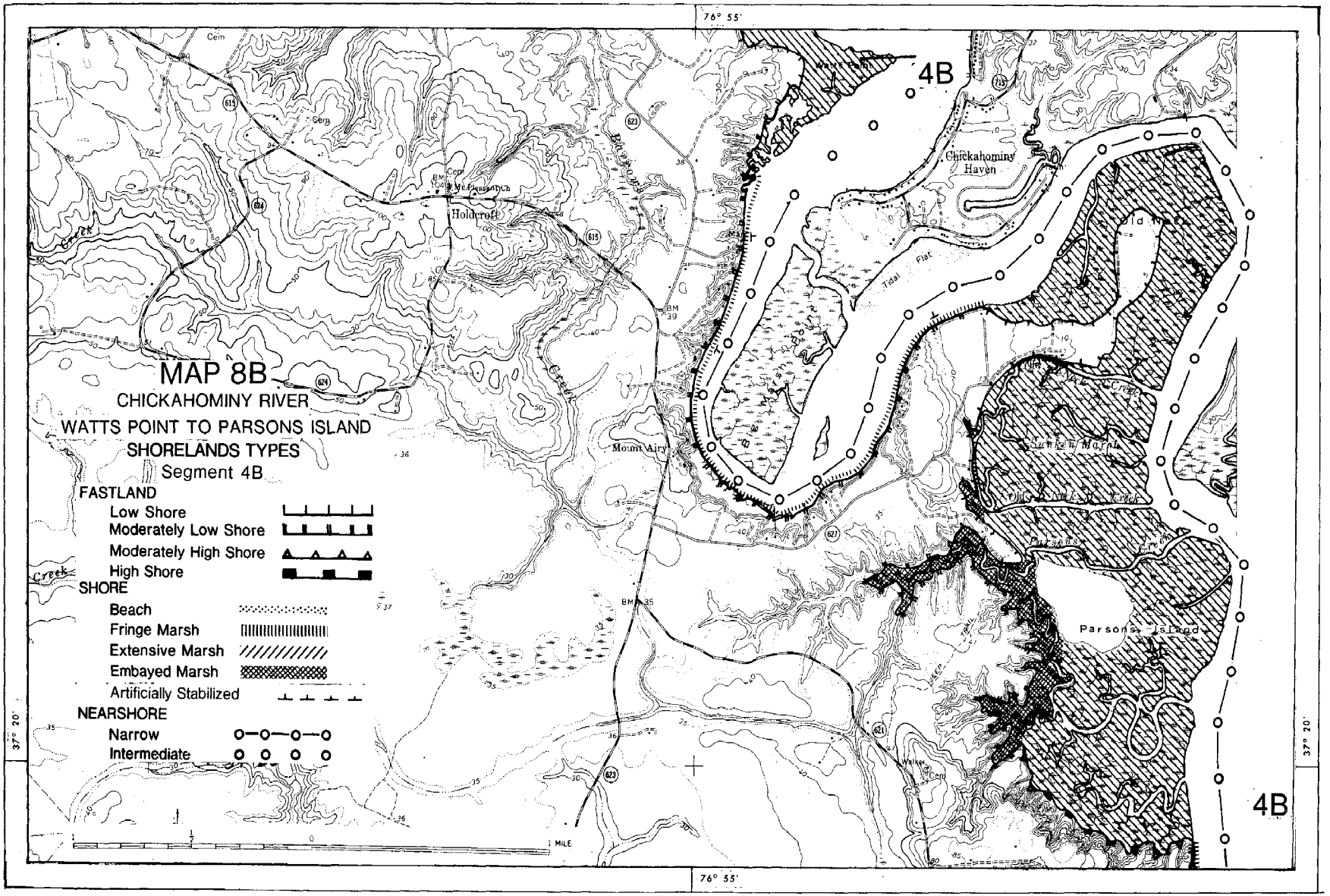

MAP 6C
JAMES RIVER
TURKEY ISLAND CREEK TO HARRISON POINT
FASTLAND USE, OWNERSHIP, EROSION
Segment 3
USE
Agricultural A
Recreational RC
Unmanaged
Wooded W
OWNERSHIP
Private 1
EROSION
Moderate
Slight or No Change No Symbol
Accretional
77° 15'
37° 22' 30"
Turkey Island Creek
Turkey Island
Granville
Grace Chapel Cem
Lamptie Hill
Isle Swamp
ISLAND
WILDLIFE REFUGE
Presque Isle Swamp
TURKEY ISLAND
PRESQUILE NATIONAL WILDLIFE REFUGE
Presque Isle
Ferry
Bermuda Hundred
Shirley
Cem
Sandpits
Eppes Creek
EPPES CREEK
Eppes Island
Harrison Point
Tidal Flat
1W
1A
1RC
3

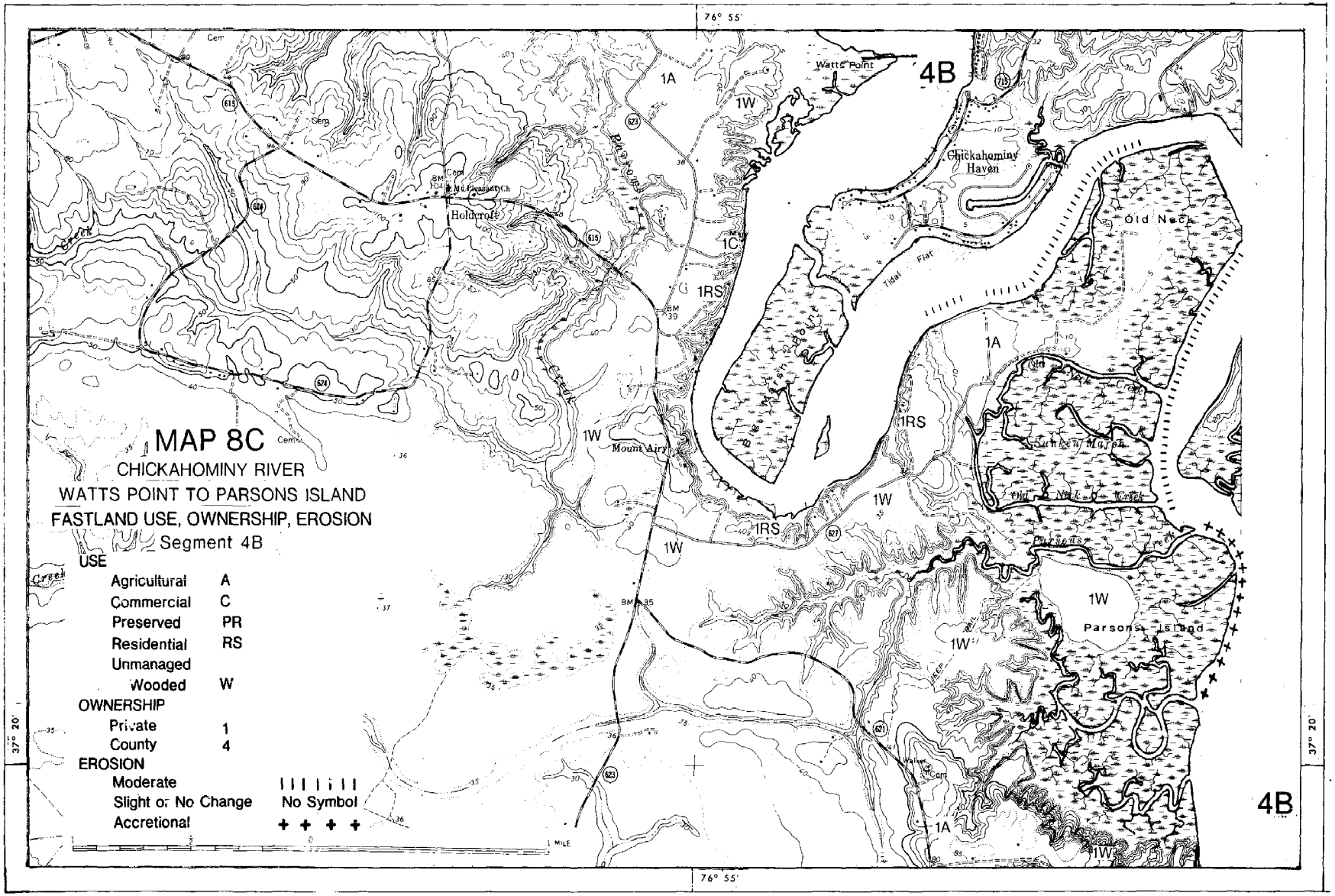

MAP 7A
CHICKAHOMINY RIVER
MATAHUNK NECK TO BIG MARSH POINT
TOPOGRAPHY AND CULTURE
Segment 4A
// = Segment Boundary
/ = Subsegment Boundary
4A
Matahunk Neck
Chickahominy Shores
Turner
Wilcox Neck
Barrows Creek
Graves Landing
Pumping Station
Camping Area
Sandpit
Walkers
Rock-A-Hock
Ebenezer Ch
Cem
Substation
AQUEDUCT
Lanexa
Fish Hat Landing
Watts Point
Mount Airy
Tidal Flat
NEW KENT CO
JAMES CITY CO
76° 55'
37° 25'
MILE

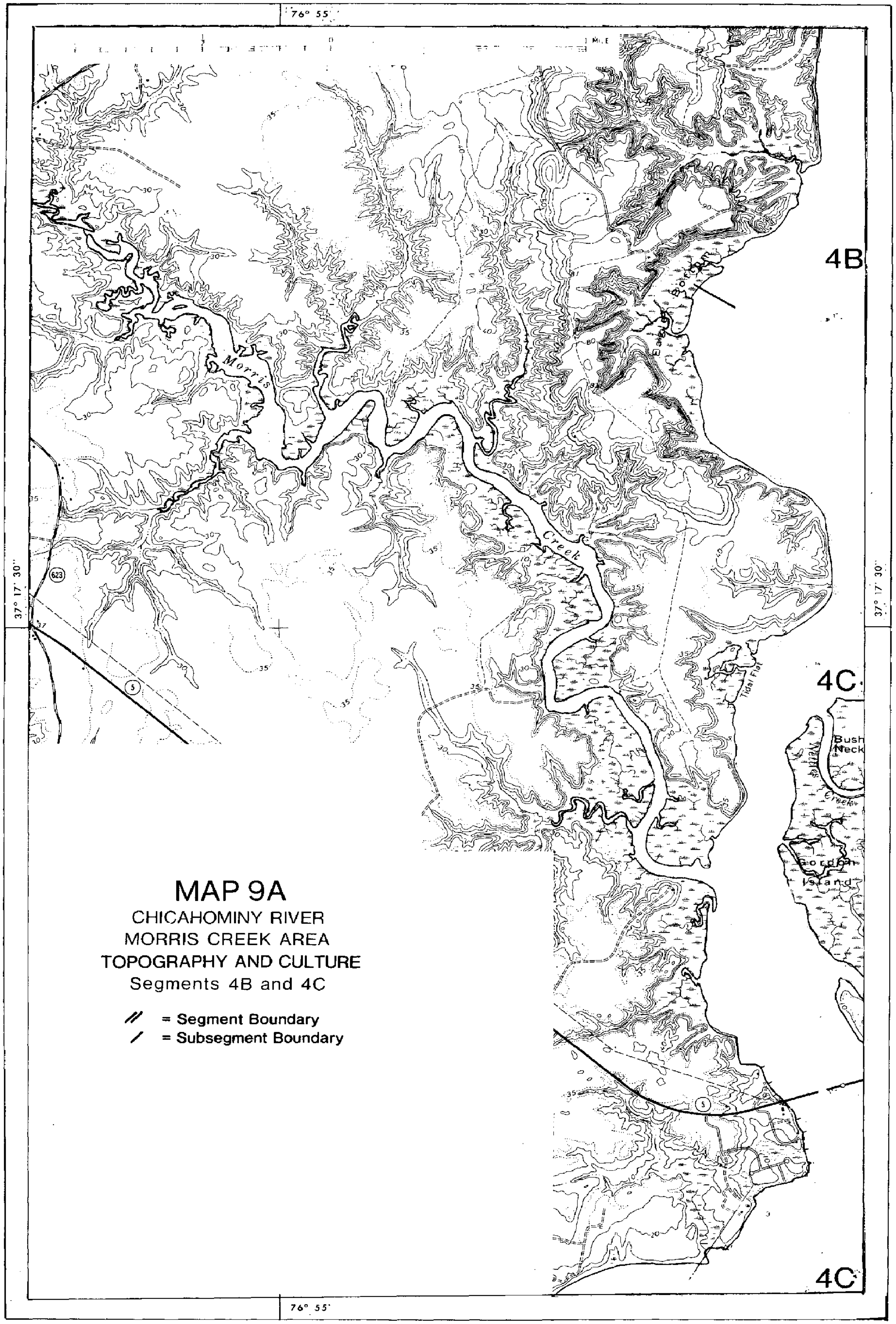

MAP 7B
CHICKAHOMINY RIVER
MATAHUNK NECK TO BIG MARSH POINT
SHORELANDS TYPES
Segment 4A
FASTLAND
Low Shore
Moderately Low Shore
High Shore
SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
NEARSHORE
Narrow
Intermediate
4A
4A
4A
Wilcox Neck
Turner Neck
Matahunk Neck
Chickahominy Shores
Barrows Creek
Graves Landing
Pumping Station
Camping Area
Sandpit
Rock-A-Hock
Walkers
Lanexa
Substation
Aqueduct
Mount Airy
Tidal Flat
NEW KENT CO
JAMES CITY CO
37° 25'
37° 25'
76° 55'
76° 55'
1 MILE


76° 55'
37° 25'
Lanexa
1 MILE
Walkers
Rock-A-Hock
Ebenezer Cem
Substation
AQUEDUCT
Pumping Station
Camping Area
Sandpit
Matahunk Neck
4A
Chickahominy Shores
Turner
Tidal Flats
Wilcox Neck
Fish Hook Landing
Graves Landing
Barrows Creek
NEW KENT CO
JAMES CITY
1W
1RS
1A
1C
Holdcroft
Watts Point
Mount Airy
Tidal Flat
Cem
MAP 7C
CHICKAHOMINY RIVER
MATAHUNK NECK TO BIG MARSH POINT
FASTLAND USE, OWNERSHIP, EROSION
Segment 4A
USE
Agricultural A
Commercial C
Residential RS
Unmanaged
Wooded W
OWNERSHIP
Private 1
EROSION
No Data


MAP 8A
CHICKAHOMINY RIVER
WATTS POINT TO PARSONS ISLAND
TOPOGRAPHY AND CULTURE
Segment 4B
// = Segment Boundary
/ = Subsegment Boundary
76° 55'
37° 20'
4B
Watts Point
Chickahominy Haven
Old Neck
Tidal Flat
Holdcroft
Mount Airy
Sunken Marsh
Old Neck Creek
Parsons Island
Creek
1 MILE


MAP 8B
CHICKAHOMINY RIVER
WATTS POINT TO PARSONS ISLAND
SHORELANDS TYPES
Segment 4B
FASTLAND
Low Shore
Moderately Low Shore
Moderately High Shore
High Shore
SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
Artificially Stabilized
NEARSHORE
Narrow
Intermediate
4B
4B
Chickahominy Haven
Holdcroft
Mount Airy
Parsons Island
Tidal Flat
76° 55'
37° 20'
1 MILE

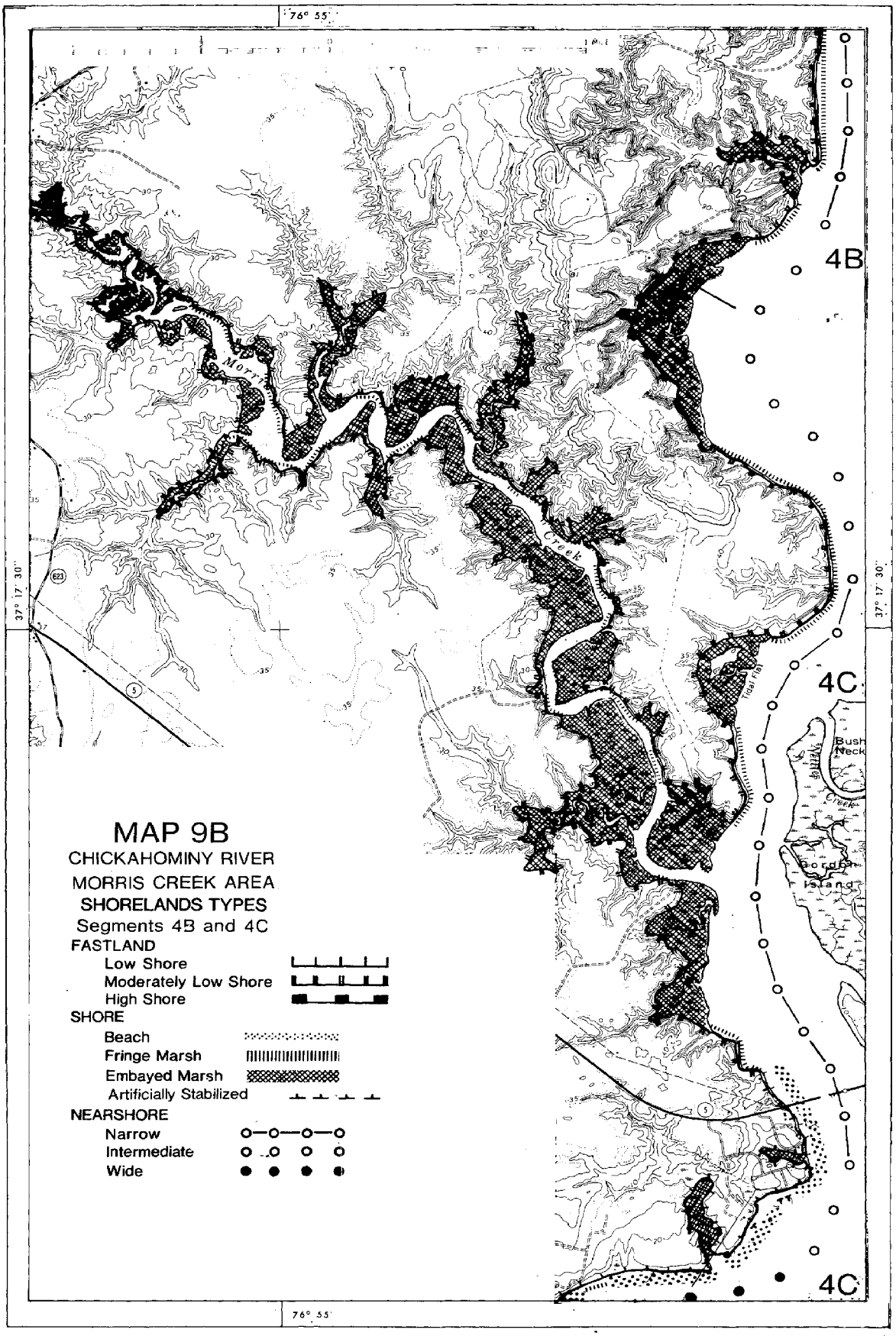

MAP 8C
CHICKAHOMINY RIVER
WATTS POINT TO PARSONS ISLAND
EASTLAND USE, OWNERSHIP, EROSION
Segment 4B
USE
Agricultural A
Commercial C
Preserved PR
Residential RS
Unmanaged
Wooded W
OWNERSHIP
Private 1
County 4
EROSION
Moderate
Slight or No Change No Symbol
Accretional
76° 55'
37° 20'
Watts Point
Chickahominy Haven
Old Neck
Tidal Flat
Holdcroft
Mount Airy
Parsons Island
4B
1A
1W
1C
1RS
MILE

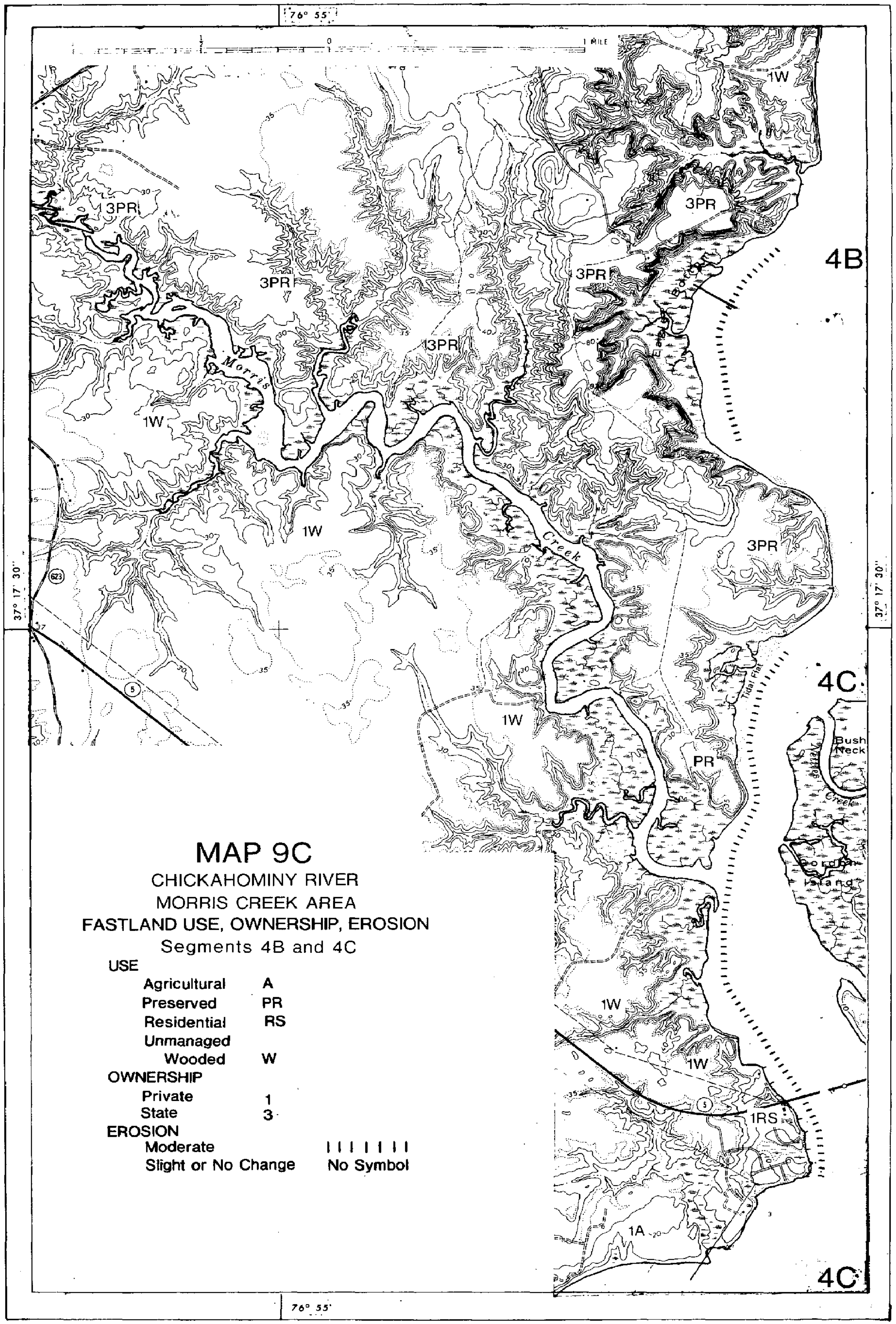


MAP 9A

CHICAHOMINY RIVER
MORRIS CREEK AREA
TOPOGRAPHY AND CULTURE
Segments 4B and 4C

// = Segment Boundary
/ = Subsegment Boundary


76° 55'
37° 17' 30"
4B
4C
4C
Morris
Creek
Bush
Neck
Creek
Gordon
Island
MAP 9B
CHICKAHOMINY RIVER
MORRIS CREEK AREA
SHORELANDS TYPES
Segments 4B and 4C
FASTLAND
Low Shore
Moderately Low Shore
High Shore
SHORE
Beach
Fringe Marsh
Embayed Marsh
Artificially Stabilized
NEARSHORE
Narrow
Intermediate
Wide



MAP 9C

CHICKAHOMINY RIVER
MORRIS CREEK AREA
FASTLAND USE, OWNERSHIP, EROSION
Segments 4B and 4C

USE	
Agricultural	A
Preserved	PR
Residential	RS
Unmanaged Wooded	W
OWNERSHIP	
Private	1
State	3
EROSION	
Moderate	I I I I I I I
Slight or No Change	No Symbol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